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AUTHOR Foster, Kathleen M.
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ABSTRACT

The guide offers elementary teachers narrative statements about creative thinking in teaching and learning and contains over 100 ideas for gifted classroom activities. Narratives address the following topics: rationale for creative thinking in the classroom, definition of creative thinking, individual development of creativity, teacher and learner responsibility in creative thinking, and creative problem solving. Classroom applications of creative thinking skills are divided into three dimensions--gathering and/or isolating data (awareness, fluency, flexibility); doing things with data (perseverance, elaboration, complexity); and doing things differently (courage, curiosity, imagination, originality). Finally, creative thinking and creative problem solving are covered with sections on the creative problem solving (CPS) process, CPS process for a futuristic problem, a CPS center in the classroom, and materials for a CPS center. A list of teacher and classroom resources associated with creative thinking skills concludes the document. (SBH)

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A GUIDE FOR TEACHING CREATIVE THINKING SKILLS

AND

CREATIVE PROBLEM-SOLVING IN THE GIFTED CLASSROOM

Prepared by

Kathleen M. Foster

Advisory Committee

Leif Fearn, Chairman
William G. Burrows, Jr.
David D. Hermanson
Patricia Ann Markel

San Diego City Schools
San Diego, California
1979
Unedited

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PREFACE

A Guide for the Development of Creative Thinking Skills and Creative Problem-Solving in the Gifted Classroom has been developed on the basis that thinking is a high priority area of content in the elementary school. The material in the guide offers teachers the opportunity to learn about creative thinking in the classroom and to apply their knowledge of creative thinking skills to classroom operations. After many years of largely informal attention to thinking in the classroom and essentially after the operation of the Creative Problem-Solving Center it has become obvious that thinking can be treated as an area of content in the classroom. This guide treats thinking as an area of content.

The author expects that the guide will prove enormously useful to any teacher who is willing to expend the time and energy necessary to internalize and apply a creative thinking theory. For children in those teachers' classrooms, creative thinking is likely to come alive.

Scott C. Gray

Scott C. Gray
Assistant Superintendent
Student Services Division

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INTRODUCTION

The purpose of this guide is to provide a theoretical point of departure and classroom-useful applications in creative thinking. The point of departure is theory. The classroom-useful applications are creative thinking activities.

I have learned many things during the past several years of serious association with creative thinking in the classroom. Foremost among them is that creative thinking in the classroom is not the daily use of twenty-minute parlor games and mental tricks that my students and I might find interesting and playful. As soon as I discovered that intellectual gymnastics and perceptual gaming left me and my students with nothing more than several funny minutes, I had to confront the fact, as we all must, that effective teaching rests on knowing the content. The content of creative thinking is theoretical, so I began the tedious job of reading, studying, and applying creative thinking theory in the classroom. I think every teacher must do the same if he/she intends that the school will have an impact on the creative abilities of children.

This guide makes several narrative statements about creative thinking in teaching and learning. It also contains over 100 classroom-useful ideas. If teachers do not invest sufficient time in the business of learning theory, the classroom ideas will soon run out. If teachers do invest time in interesting theory, the classroom ideas will be unnecessary.

Kathleen Foster
1978

NARRATIVES IN CREATIVE THINKING

RATIONALE FOR CREATIVE THINKING IN THE CLASSROOM

"We are at a point in time--as all people have been--when the future is colliding with today. Children in school face an even more perplexing time than did their parents because of an increasing rate of change." (James L. Olivero, *Looking at the Challenges of the Future,* 1978)

Educators face a challenge, perhaps more than any other educators before us, of preparing students for what they might encounter in the future. What the future holds can be posited only by calculated guesses. As Olivero said above, the impact of the future upon today is accelerated and demands a preparation for what might be. If this is true, and history suggests it might be, then the questions, uncertainties, and situations that today's learner may engage in his/her tomorrows may very well require more than the one solution process, more than the "right answer" convergent thinking found in our classrooms.

Although it is certainly not proposed that convergent thinking should be abolished from the school, for it should not be, it is imperative that we apply increasing amounts of divergent thinking to school curriculum. Both convergent and divergent thinking are necessary for creative thinking skills that might assist the learner in exploration of possible answers to the unknown questions of today.

Convergent thinking is that process found most frequently in our classrooms today. It is the process of the teacher's presenting a question with a predetermined response and solution pattern in mind. Convergent thinking is the student reading or searching for the "right answer" and responding in kind.

Divergency promotes free thinking, open flow of thoughts, the development of new ideas, the use of imagination. Divergency allows the removal of a defined focus upon "one right answer."

The kind of problems people will face in the future, which may be today, require more than the "pat answer" that is typical of the convergent classroom. Therefore, to prepare the students of today for their futures of tomorrow, let us teach them how to reason, how to think. We cannot teach them all of the right answers. We don't even know the questions. But we can provide them with the skills to think their way through a problem. Enter creative thinking skills. In a creative thinking classroom the curriculum is approached via a creative thinking model that gives the learners processes with which to face and solve the unsolved problems in their future.

WHAT IS CREATIVE THINKING?

Creative thinking appears to be almost whatever anyone wants to accept in the literature. There are as many definitions as there are people who write about it. Definitions range from perspectives on inviolate freedom to highly disciplined intellectual behavior.

As teachers we ask, "How do I put creative thinking in the classroom without causing chaos?" Mary Meeker, *The Structure of Intellect: Its Interpretation and Uses*, 1969, states that ". . . divergent generation does not proceed willy-nilly; the divergent thinker is not a scatterbrain; the worthwhile generation of information requires discipline and guidance."

Fearn states, "The extent to which creative thinking is likely to occur in a classroom finally depends upon the responsibility the teacher assumes for causing creative thinking to occur, and how effective the teacher is at holding learners responsible for creative thinking." (*Teaching for Thinking*, 1977)

The next several paragraphs are an explanation of what creative thinking skills in the classroom look like and, hopefully, what will occur if they are used systematically. Creative thinking, used systematically, requires discipline, guidance, and responsibility.

The emphasis of creative thinking skills in the classroom is on the thinking behaviors of learners as they search for ways to formulate and clarify problems so that solutions or roads toward solutions can be speculated. Creative thinking allows learners the opportunity to be courageous in offering for public consideration their own unique possibilities for solutions.

Creative thinking skills are not unique procedures in the sense that the process necessitates completely new teacher behaviors. For years classroom teachers have been using thinking skills in their classrooms, perhaps more by chance or because it felt right than by purpose.

The classroom teacher who intends to systematically use creative thinking skills in the classroom must internalize a creative thinking theory--as theory--which must then lead to classroom practices. The theory upon which the content of this guide is based is Individual Development: Creativity. Other reference material for creativity is listed in the reference section. It is important to internalize a creative thinking theory, for without theory the teacher has parlor games, not creative thinking objectives and processes.

Creative thinking and creative problem-solving processes apply to all areas of school content learning and all levels in the grade level range. The processes hinge upon the kinds of problems posed, the kinds of questions asked about the problems, and the variety of approaches open to teachers and learners for addressing problems and questions. Creative thinking materials and tasks stimulate both problems and questions, as well as proceed through problem-solving processes.

A "problem" for creative thinking purposes is a set of conditions for which the teacher does not already have a solution pattern. Typically, teachers and texts pose questions or problems for which there are answers and solutions readily available. Years of such question-answer orientation have trained many teachers to feel confident only when answers or solutions are in hand. Creative thinking tasks place learners and teachers in the same position relative to immediate solutions: neither has any. Teachers and learners pursue the system for approaching problems. The systems represent the content of creative thinking skills.

Creative thinking skills open the teaching-learning relationship to both teachers and learners. Creative thinking places in the hands of teachers that

TEACHER AND LEARNER RESPONSIBILITY IN CREATIVE THINKING

Creative thinking does not occur without discipline, that is, discipline in the sense that an individual develops self-control and acceptance of responsibility for self. In the two previous sections, reference has been made to teacher responsibility and to learner responsibility. It must become clear to anyone intending to use a creative thinking model in the classroom that consistent, systematic behavior occurs on the part of the teacher, and on the part of learners.

Responsibility is divided into five categories. The chart below illustrates five prospective levels of responsibility and possible criteria in a creative thinking classroom.

Learner Responsibilities:

Criterion V: Expertise

Criterion IV: Variations on a Task

Criterion III: Self-Initiated Quality

Teacher Responsibilities:

Criterion II: Do a Task Accurately

Criterion I: Engage in a Task

Begin with Criteria I and II. Criteria I and II belong with the teacher. The teacher owns these responsibilities and establishes the educational objectives for the learner.

The first criterion level is established when the teacher decides what exercise or assignment is beneficial and meaningful to the learner. For example, the first-grade teacher decides that students should master the objective of identifying geometric shapes: circles, squares, and triangles. The learners are presented with a series of tasks over a period of time in which to ensure the mastery of the objective. The sixth-grade teacher determines that learners need to become familiar with Shakespeare's life and times. The learners are to meet this objective by doing individual research projects. Therefore, the first criterion level is established when the teacher directs the learners to "Do This Task."

The second criterion level also remains with the teacher. In the second level, the teacher is monitoring the learner's performance regarding accuracy and mastery by a predetermined set of teacher-set criteria. The teacher evaluates the learner's performance according to the level established for mastery of the concept. The teacher is the evaluator. The teacher sets the standards and on the basis of the degree to which the learner meets the standards, the teacher

knows something about the learner's performance regarding a specific objective. Realize that in Criteria I and II the teacher decides what will be done and the level of accuracy needed before the learner is credited for accurately satisfying the objective.

Criterion III gives the learner opportunity for responsibility. Criterion III, self-initiated quality, occurs when the learner has satisfied the requirements of accuracy established by teacher and moves into a position of being responsible for the quality of his/her work. The sixth-grade assignment was on Shakespeare. One student met the requirements, but put the minimal amount of effort and time into doing so. The answers and responses were briefly stated with little elaboration. The minimum number of resources was used. The work when turned in was of the appearance of a first draft that had been erased, scratched out, and carelessly tossed about. There were no signs of particular interest on the part of the learner in the subject. The learner had met the minimal requirements for Criterion II.

Another student has turned in a paper for the same assignment. This paper is interesting to read. The responses show insight, and it is obvious that the learner has spent some time giving thought to what it must have been like in Shakespeare's lifetime. The learner has used various sources to find the answers to questions that the teacher presented and the questions that the learner proposed for him/herself. This learner's work is neatly presented. It is obviously not a first draft. The paper has been edited and carefully rewritten before being turned in. There are sketches and illustrations included in the report that make it more meaningful and interesting. These are extra touches added by the learner in the interest of quality. It is obvious that the student has taken pride in the accomplishment of the assignment. The learner has achieved a level of self-initiated quality that exceeds the basic requirements established by the teacher for the entire class.

In Criterion IV the learner accepts the responsibility for meeting the requirements established by the teacher (Level II), has established and met his/her own self-initiated quality (Level III), and has given thought as to how to make a meaningful application of the assignment. An example of the responsibility taken by this learner is the learner's presentation of the research project. The learner may have presented the paper in the form of an interview conducted by Walter Cronkite as commentator with Shakespeare and his colleagues, the common man on the street, the politicians and religious leaders of the time. Another variation the learner might use is a videotape or cassette recording accompanied by a read-along book in story form of Shakespeare's lifetime.

The variations are not as important as the fact that the learner makes the variations. The learner *chose* to make the variation. It is important to realize that the teacher *did not direct* the learner.

Because the learner has surpassed Criteria I, II, and III, it is assumed that the variations are made in such a manner that they are unique and well done.

In Criterion V the learner at this level is the class expert on this particular subject. This is the learner who knows more, has read more, researched more, and importantly, *internalized* the information. This learner has bridged the concepts; the learner has made association and relationships between concepts and questions asked. The learner has opinions based on the things he/she has read. The learner has speculated--is/was curious and imaginative in seeking

answers to those things pondered. The learner at Level V has dared to form an opinion and has given thought to the subject. Classmates and teacher look to this learner as the individual who will shed more light and insight on the subject.

The learners described in the five levels of responsibility exemplify characteristics of learners taking the responsibility upon themselves for meeting the self-imposed criteria for acceptable work. These five levels are not separate; they do flow and blend together. The important thing that occurs regarding responsibility in a creative thinking classroom is that at some time the learner must own the responsibility for his/her learning.

CREATIVE PROBLEM-SOLVING: A RATIONALE FOR QUALITATIVE DIFFERENCE*

The question of qualitative difference has been consistently troublesome in gifted education, largely because educators of the gifted have been reluctant to settle upon an operational definition. The absence of an operational definition has its benefits, as educators of the gifted are offered valuable flexibility in program design, as well as the opportunity to define as qualitative difference virtually whatever they finally approve as program. However, special education rests upon its specialness and our inability, or unwillingness, to operationally define the specialness in gifted education, to say nothing of a like condition with regard to criteria for certifiability, which leaves us in the precarious position of defending what is publicly perceived as an amorphous educational notion.

This rationale rests upon a definition, and the resulting implications, that has been posited in various situations during the past several years. This rationale has been used in the development of curriculum and in the defense of existing programs. It is useful and it defines the specific nature of qualitative difference in creative problem-solving.

We begin with the position that there are at least two kinds of educational processes: general education and special education. General education is firmly positioned in the heritage of the American common school with its curricular parameters and its human focus. General education is designed to generate a literate citizenry among the broad middle of the population.

General education, however, it was found some decades ago, suffered from the malady typical of any mass educational effort; that is, it systematically excluded those in the population who did not fit its design. Gradually over the past several decades it has become increasingly necessary to include exceptional human cases in the educational process rather than note exceptionalities as the rationale for exclusion. The result has been the development of special education services, carefully articulated for each newly defined dimension of exceptionality. The special education services were necessary

*CPS Center: Evaluation Report, 1977-78. Submitted to Dr. Robert Bell, San Diego County Department of Education.

because there existed in the population relatively small samples of individuals for whom general education was inappropriate, and the inappropriateness represented systematic exclusion from the public education process.

Special education has become an effort to offer something different from general education, where the differentness is a function of the nature and needs of the exceptional individual in question. The key word is different. Education for people who are visually handicapped focuses its attention upon coping with a visual handicap so that the individual can be a productive and satisfied member of the society. Educational services for individuals who conceptualize more slowly than average points its design to helping such exceptional individuals conceptualize those factors that are necessary for survival, and the educational process is specifically managed so as to cause conceptualization in ways not typically found in general education. Those are two examples of differentness.

Enter gifted children and youth. There are some individuals in the population who are not appropriately served by general education because general education is pointed toward the broad middle of learning capacity and the individuals in question exceed the broad middle. Criteria used by states and districts for certifiability aside, the fact is that gifted children and youth have the capacity to function at a higher level conceptually than their chronological peers. In a word, they are at least school-brighter than their age-mates. In general education the gifted students typically make adjustments in their apparent abilities so that they better conform to the educational environment. The educational environment does not meet their educational needs; there is, therefore, a need for some dimension of special education, or differentness.

Gifted education is the educational system's attempt to create the different environment. We in gifted education have come to call the attempt one of achieving qualitative difference. The key word, again, is difference. The question requires a definition of difference.

Educational efforts can be defined in terms of content and process. There are certain kinds of things typically taught in certain kinds of typical ways in general education. Difference means changing the focus of content and process. Qualitative difference in gifted education is achieved to the extent that the content and process of the educational experience are both changed in the direction of approximating the nature and needs of gifted individuals.

The Creative Problem-Solving Center leads to the achievement of the definition above. The content focus explicitly translated within the creative problem-solving and creative thinking skill mileu is thought-based, both as discrete content and as the avenue toward conceptualization within the traditional school content framework. While in general education the content focus is traditionally defined literacy skills, qualitative difference is achieved in the creative problem-solving framework by focusing content attention on thinking skills.

The essential process in general education can be perceived as a top-down political structure in which the learner is specifically directed toward learnings defined by those above. The creative problem-solving format, on the other hand, places the learner in the position of creating the learned concepts in the educational process. Even though the teacher (typically above in the political structure) tends to define the tasks, the result of learner attention

to the tasks is conceptual perspectives over which the teacher cannot possibly have control. Hence, the fact of the learner's being in control of his/her own learning content is a factor of difference.

To summarize, the Creative Problem-Solving Center brings to gifted education a perspective on qualitative difference by virtue of its redefinition of educational content and process. Throughout the operation of the Center's activities this year, it has been quite apparent that even among teachers of the gifted, the content and process are perceived as different.

CLASSROOM APPLICATIONS OF CREATIVE THINKING SKILLS

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INTRODUCTION TO TASKS

The following tasks have been categorized under particular creative thinking skills articulated previously and shown in the Fearn model. However, it would be contradictory to the creative thinking model to label tasks with a fixed label. Creative thinking implies there may be more than one way to perceive and approach a task or a problem. This theme is consistent throughout the theory, rationale, and behavior of both teacher and learner.

Keep in mind that the creative thinking task is labeled in the way the teacher perceives it. However, the teacher and learner are equals in creative thinking processes. The teacher is not directing or leading the learner to a predetermined response. Therefore, the learner not only should be allowed, but encouraged to perceive the task in his/her own way.

For example, if a task has been placed in the section on curiosity, but the learner approaches and perceives it primarily as complex, the task is primarily complexity for that learner.

Several tasks throughout the following material are labeled with the Structure of Intellect designations for two reasons. First, SOI is one important perspective on thinking processes and must be viewed within the content of creative thinking, not apart from it. Second, creative thinking is not limited to the Divergent Production block of abilities in SOI. The designations that follow will illustrate that clearly.

Teachers who have been introduced to SOI will be familiar with the SOI trigram. The designations that follow reflect a realistic variation on the trigram in that they show the multiple ability perspective so necessary when the focus is on learner behavior rather than teacher intent. For example, a teacher might intend to cause the SOI ability--NMU--to occur when asking the awareness question, "What is the smallest state in the union?" However, a learner might find it necessary to investigate the question, in which case the SOI ability--CMU--occurs. If the learner simply responds from memory, the ability--MMU--occurs. Readers will see the following designation on the "smallest state" task:

Dimension One: Gathering and/or Isolating Data

AWARENESS

Awareness is the basis of all creative thinking. Awareness is paying attention to what is going on in one's environment and inside one's self. It is recognized that creativity does not occur in a vacuum; there must be a foundation of information from which it can be developed. For example, awareness is knowing the letters of an alphabet, knowing the times tables, knowing where you live, knowing how an ice cube dropped down the back of your shirt feels. Awareness is a collection of experiences. Awareness is data and information.

To help learners become aware means providing them with tasks that cause them to pay attention to and recognize things about them. For example: when asked to name five people in the class who have brown eyes, the learner is called upon to pay attention to eye color. When asked to place the first names of classmates in alphabetical order, the learner must know the spelling of the first names of classmates, recognize the order of the alphabet, and know the process by which words are alphabetized.

A great deal of school content is awareness if the learner experiences awareness behavior. The teacher who promotes learning experiences that cause the learner to pay attention to and notice aspects of school curriculum enhances awareness behavior.

Awareness in math is finding all the fives on a page, knowing how to reach the sum of eight, counting out eight pages of paper equally to four people.

In spelling, awareness is noticing the "ing" endings in a given set of words, finding the words that contain the spelling pattern "at," listing words that begin the same as baby, bottle, and big.

Awareness is noticing, collecting information. The following list of awareness tasks serves that purpose.

Awareness Tasks

Notice the people who buy lunch on Wednesday.

Notice the number of windows in your classroom. CFU

Notice the number of holes in the pencil sharpener.

Notice the way you would spell *alphabet* if all the vowels were removed. How many consonants in the English alphabet are side by side, uninterrupted by a vowel?

Where are these people now?

Gene Autry

W. C. Fields

Gino Marchetti

Glenn Davis

Mamie Eisenhower

Al Capp

Awareness Tasks

What is the title of your math book? What is the difference between mathematics and arithmetic?

What color of chalk does the teacher use to write on the chalkboard? From what is chalk made?

What is the hardest word in your spelling book? ESS

What is orthography?

How do the British spell "color" and "honor"? Find words that have changed spelling over the years.

Notice the number of words per line in your favorite poem. Write a poem of your own using that pattern.

Awareness Tasks

What is the smallest state in the union?

Draw a detailed picture of the American flag without looking at a flag. Draw a picture of the flag of the state where you were born.

Make a graph comparison of the number of people in a fifth-grade class who buy chocolate milk on Thursday compared with the number of people in a sixth-grade class who buy chocolate milk on Friday.

Take a survey of the number of people in your class who play a musical instrument.

Make a list of food items that are not perishable.

Think of some kinds of fruits that are yellow. How many are yellow, then turn another color when they ripen?

Awareness Tasks

Think of mammals at the zoo that are larger than you are. Think of mammals that are smaller than you are.

Find the titles of at least five literary pieces authored by Hemingway.

Make a list of green leafy vegetable words that contain more than five letters.

Sketch your favorite toy.

C
M F S

Notice what happens if you put a drop of food coloring in a glass of water. Add a drop of detergent.

Notice what happens if you multiply a number by itself and subtract the original number from the product.

Awareness Tasks

Find some images in a floor tile

Observe and draw a hubcap from your family car.

Draw the lock on your bicycle chain.

Draw the hand grips on your bike.

Sketch your belt buckle without looking at it.

Notice and sketch the latch on the front door of your home.

Awareness Tasks

What is the brand name of your television, of your refrigerator, of your radio, of your family car, of the shoes you are wearing, of the cereal in your kitchen, of the milk you drink, of the bread with which you make toast?

_____

How many electrical outlets are in your living room?

_____

Describe your bedspread.

_____

Which direction do you turn a jar lid to remove it?

_____

How many eyelets are in your sneakers?

_____

How many "i's" are there in the name of the state bordered by Arkansas, Tennessee, Georgia, and Louisiana?

Awareness Tasks

Where do you squeeze your toothpaste tube?

_____

Name three state capitals that begin with the same letter as their state.

_____

What is your grandmother's maiden name?

_____

How many meters are in a mile?

_____

When is your mother's birthday? M M U

_____

Find out the maiden names of the assassinated U. S. Presidents' wives.

_____

How far is Quito from Yokohoma?

Awareness Tasks

How many ones are there on a one-dollar bill? C M S S

_____

How many keys are there on a typewriter?

_____

How many sides are there on your pencil?

_____

Notice which way you peel a banana. Notice which way a monkey peels a banana.

_____

Which is larger, your right hand or your left? E F R

_____

Locate the farthest point a soft drink was bottled (look on the bottom of bottle). Find the place on the map. Have a contest to see who can find the farthest location.

Awareness Tasks

What are the Cabrera Stones?

_____

Where would you look for the Hope Diamond?

_____

Name a piece of vegetation native to and only able to survive in Arizona and Sonora, Mexico.

_____

Where would you find safrole C_{10} H_{10} O_2?

_____

Read *Walden* by Thoreau.

_____

What is the phobia referring to the fear of anything that is foreign or strange?

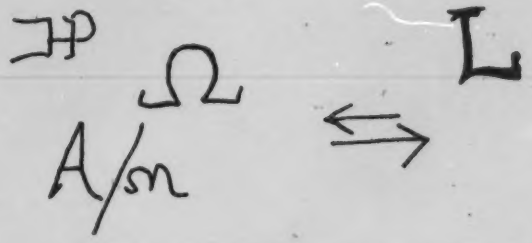
Awareness Tasks

antecibum a.c.
postcibum p.c.

How do these terms relate to directions found on a medical label?

What do these symbols mean and how are they related?

C F U R



List three positive, true things about a member of the class.

How many pictures are on the walls of your living room? Draw or describe them.

List as many billboard ads as you can remember seeing on the highways.

M F U M S

Draw the telephone dial without looking at a phone.

Awareness Tasks

List the things that you would like to change about yourself.

_____

List five success experiences you had this past year.

_____

What was your neighbor in the class wearing yesterday? Write a sentence describing it.

_____

Tell how you would fix scrambled eggs.

_____

Make a list of things you had to eat yesterday.

_____

How many things in nature and in your environment have symmetrical shapes? List them.

Awareness Tasks

What do the prefixes tri, etra, hex, hept, deca, equi mean, and what is their relationship to math?

What do the suffixes hedron, gon, and lateral mean, and what is their relationship to math? Give examples.

Read John F. Kennedy's *Profiles in Courage*. Read Arthur M. Schlesinger, Jr.'s *A Thousand Days*.

What is the origin of the names of the states Kansas, Rhode Island, and California?

Find three varied meanings for the song title "Dixie."

Name five states originating from Indian names.

Awareness Tasks

How many signers of the Declaration of Independence were younger than 32, were older than 41? What were the different vocations of the signers?

_____

What did the Homestead Act intend to do? What area of the U.S. is still available under Homestead?

_____

Which amendment to the Constitution:

1. Refers to the abolition of slavery?
2. Gives women the right to vote?
3. Was ratified first?

_____

What is a quilting bee?

_____

Why does a horse wear shoes?

_____

On what occasion did the Liberty Bell crack? On what occasion did it ring?

Awareness Tasks

Where do hummingbirds stay in the rain? How big are hummingbird eggs? How fast do their wings and their hearts beat per minute?

In the story "The Jumping Frog of Calaveras County" by Mark Twain, there is use of elegant and slang language. Give examples of how words characterize the speaker.

What characters would use the words: compliance, garrulous, conjectured, tranquil feller, foller, fagend, cipher it down?

Describe the difference between dictionary and slang definitions of words.

Outline the assignments and expectations you would have for yourself if you were in charge of your reading assignment for four weeks.

Talk to someone whose native language is not English.

Talk to someone who watched, via television, John Glenn set foot on the moon's surface. Ask this person what he/she was thinking about regarding space travel.

Awareness Task

Name a four-legged creature that has not changed in 200,000,000 years.

What is the difference between: C M R

1. Induction and deduction?
2. Egoist and egotist?
3. Uninterested and disinterested?

Read *The Canterbury Tales* by Geoffrey Chaucer. Read *Gulliver's Travels* by Jonathan Swift.

Vocabulary Search:

1. If the meal served before you was noisome, it would have been what kind of meal?
2. The ocean was plangent. Describe the ocean.
3. What the judge said was gnomic. What did the judge say?

In his fifty-first year, the man responsible for the Emancipation Proclamation was told something by an eleven-year-old child that prompted this man to change his daily habit of grooming. You have heard of this man. Who is he and what was he told?

Awareness Tasks

What do the words "auld lang syne" mean? List at least three occasions, other than midnight of December 31, on which the words are heard.

As you ride along the streets and freeways, how many letters in the shapes of structures can you see around you?

Mystery and Magic of the Circle:

The design of the circle has many meanings to various cultures. Research the various magical, medicinal, and religious symbols and practices used by various cultures. Illustrate your find.

If you were told to ameliorate your game of Scrabble, what would you do?

How would an anemometer be useful to an aviator?

What does queue have to do with buying a ticket to the best movie in town?

Awareness Tasks

Do you know anyone involved in pedagogy?

Which would you rather have, a snippet or a shoal of a product whose ingredients were: oatmeal, raisins, brown sugar, molasses, palm oil and/or partially hydrogenated soybean oil, date filling, fructose, honey, eggs, partially hydrogenated coconut oil, bicarbonate of soda, salt, spice, sesame seed, and flavor?

List things that are biannual and things that are biennial.

Would you prefer to know a virulent person or a virtuous person?

How was wampum useful to the natives of a continent that has two words and 12 letters? How was wampum obtained? Draw a picture of wampum. What would you use for wampum today?

Find the relationship of Canis Major, Nile River, and Sirius--shining so brightly.

Awareness Tasks

Slang Bang Rang:

The following slang words can be put into at least one of the categories below. See if you can fit each word under one of the categories.

AUTOMOBILES DANCES IN LOVE BASKETBALL

benzine buggy, swisher, on fire, truckin', gasser, the bump, hustlebuggy, mashed, cager, bone crusher, ringer, carrying the torch, scorcher, dame-crazed, bucket, jitterbug, lemon, boggin', jalopy, hoopster, hustle, jamming, rebound, hardwood, shaky-shivery, dip, tin-lizzie, guy-goony, swizzle

Make a list of slang words your parents and grandparents used. Let your peers guess what topics they represent.

(This idea is adapted from "Making Slang Dictionary," *Folklore*, Scholastic Book Services, New York: 1975.)

Write one sentence that explains what a printout is. Write a sentence that uses the concept of printout but does not use the term.

Find three different things in this picture. Describe what you see.

Awareness Tasks

Find five symmetrical and consummable items.

What are kilowatt hours? Make a list of terms used in the measurement of energy. How many kilowatt hours does your family use in a five-day period? Keep a chart and find out.

Write an explanation for the following statement:

A cubic foot of water weighs only 66 pounds at sea level, but its weight is sufficient to crush a strong person under other circumstances.

Find someone who is 993 months old. Find someone who is 93 months old. Find someone who is 39 months old. Make a list of ways they are alike. Make a list of ways they are different.

How many denominations of coins can you find that have:

1. Men with pigtails or with ponytails?
2. Men with chin whiskers?
3. A building on at least one side?
4. The world "liberty" on the coin?
5. A head facing toward the right?

Awareness Tasks

How many vowels are found in 10 lines of a book you are reading? Which word is used most often on the page of a book you are reading? Which word is used most often on a page of *Time* magazine? Which letter is used the least on the same page?

_____

How does ethylene effect the fruit you buy at the market?

_____

Name at least three different species of birds by their bills and by their feet.

_____

How is a worm like a water bed?

_____

Find out how the earthworm's pulmonary system is different from that of a robin.

_____

If there were not more birds, how would the balance of nature be affected?

Awareness Tasks

Think of something that has been called a wolf peach, a love apple, 65 pounds of which are consumed by each American per year and even was ruled on by the Supreme Court.

What is the inverse of putting on your jacket?

What is the inverse of putting the cereal box away?

What is the inverse of ten divided by two?

What is the inverse of 100 minus 10?

What is the inverse of the inverse 1,000 divided by 20?

The ecologists showed concern for the relationship between organisms and their environment.

What concerns would the ecologists have for the servals and caracals?

Would the roadrunner prefer a sand dune or an ice pack?

Name at least three species of nocturnal predators.

How might the harpy eagle disguise itself in its natural habitat?

Where would the ecologists find the diving spider. How would this spider sustain itself under water as it searched for its prey?

Find three examples of species that have four wings and disguise themselves by mimicry, crypsis, and protective resemblance.

What has caused two million untamed mustangs to diminish to an estimated 50,000?

In what environment would the mouflon live and in what way does it uniquely share a characteristic with the domestic sheep?

Awareness Tasks

Look at the rows of letters and find those letters than might not belong.

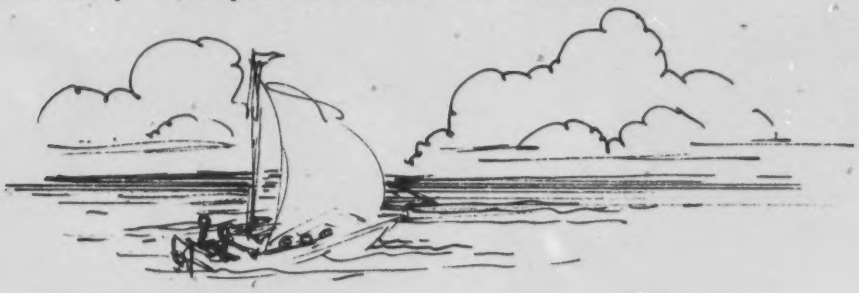
mmmm

Awareness Tasks

How many commercials are on television in a one-hour period?

_____

What story would you tell about this sketch?



_____

Observe the clouds. What arrangement did you see?

_____

Mark off a square foot area outdoors. Sit and observe everything in that area. In 15 minutes come inside and write down everything you saw. When you have finished, go back to your area and see if you forgot to list anything.

_____

Take three squares a triangle, and another geometric shape of your choice. Arrange them in a way to make a larger shape.

Awareness Tasks

Make a list of words in a 1972 edition of a dictionary that were not there in 1945.

The environment affects people in many ways. People affect their environment in many ways. Read *Alice in Wonderland*, *Tom Sawyer*, or *Sounder*. List the ways the main characters were affected or changed by their environment. List ways the main characters affected their environment.

Dimension One: Gathering and/or Isolating Data

FLUENCY

Fluent thinking is the mental flow of several possible ideas, questions, and thoughts in response to the interrogatives: how many, what kinds, and what options. Attention is on quantity, the number of responses, rather than the quality of responses. For example, if asked to name things with holes, the learner might respond with: golf courses, old tennis shoes, screens, cheese, zeroes, and donuts. Fluent thinking tasks cause a thinking behavior of searching through the learner's private collection of knowns and experiences for all possible replies to a question. The behavior of fluent thinking is important to creativity because it nurtures the flow of thought without the judgment of right, wrong, appropriate, inappropriate. Because fluent thinking is a search for all possibilities, there is no need nor place for editing from self or others. For example, responses are not held back for fear they might not be correct. All responses or ideas are accepted in fluent thinking. Fluency is essentially like brainstorming in the creative problem-solving process. Fluent thinking generates many alternatives to the definition of a problem, a solution process, and solutions to a problem. Therefore, fluency or brainstorming provides an abundant source of possibilities and alternatives for the problem solver to examine.

Fluent thinking is a creative thinking behavior found in school curriculum when the learner's behavior is one of making mental, or perhaps oral or written responses as he/she pursues large numbers of ideas. In the classroom when learner responses are shared with peers, there appears to be a chaining effect as shared responses trigger previously unmentioned ideas. The chaining effect continues to stimulate fluent thinking and thus generates many more solution processes, idea responses, question responses.

An example of fluent thinking in math is listing ways to arrive at eight. The learner responses might include: 16 - 8 =, 4 + 4 =, 64 divided by 8 =, the square root of ? = 8, 5 + 3 =, 3-1/2 + 4-1/2 =. The list of possibilities is only limited by the learner's willingness to stay with the task.

An example of fluent thinking in social studies is to brainstorm possible solutions to relevant problems. For example, learners might generate causes and/or solutions to such problems as: crime committed by people under 18 years of age; places past, present, and future that provide shelter; ways to transport people; evidence of humanity's impact on the environment.

Fluent thinking tasks can be a part of any school content area. The following list provides a sample. You and your students will be able to generate many more.

Fluency Tasks

Make a list of words that fit in place of the underline word.

The man <u>said</u>, "Stop, my child."

_____

List things found in the ocean.

_____

Make a list of scary sounds.

_____

Make a list of things you could do with a telephone book.

_____

List at least five things you could do with a short pencil with a used-up eraser.

_____

What options for taking attendance and lunch count, other than the ones presently being used in your room, can you list?

Fluency Tasks

How many ways can you think of for arriving at the product 32?

_____

What are five or more things that are orange and squishy?

_____

How do you decide who the team captain will be for P. E.? Think of at least three more ways.

_____

Make a list of things you have to do tomorrow.

_____

Make a list of things you had to do yesterday, but didn't do.

_____

Make a list of things you usually do in the summer but would like to do in the winter.

Fluency Tasks

Make a list of dairy products.

_____

Make a list of things that are recycled or could be recycled.

_____

Make a list of yellow things that are long.

_____

Make a list of pink things that are fun.

_____

Make a list of lime things.

_____

Make a list of things that are white.

_____

Make a list of red things that are in a grocery store.

Fluency Tasks

Make a list of green things that aren't plants.

_____

Make a list of perennials.

_____

Think of three or more causes of erosion.

_____

Write down all the things you associate with butterflies.

_____

Of what do you think when you hear the word "sunset"? Think of five more things.

_____

Make a list of things affected by smog. Make a list of effects caused by smog.

_____

Make a list of words that you associate with fog.

Fluency Tasks

Make a list of words that rhyme with blizzard.

_____

Write down at least five reasons for enjoying Indian summer.

_____

List at least five types of typography.

_____

Make a list of metamorphoses.

_____

How many things can you name that hibernate?

_____

Think of at least seven ways to forecast weather change.

_____

Make a list of meat groups. How many did you have this past week?

Fluency Tasks

What uses can you think of for trees? How many are recyclable?

_____

What might be some reasons for Columbus and his crew to sail across unknown waters?

_____

What can you do with pine cones?

_____

How many insects can you name? How many on your list are beneficial to humans?

_____

List three things you can do with wheat.

_____

What can you do with one roller skate?

Fluency Tasks

What could you do if you went home and found your house locked and you didn't have a key? Think of at least five possibilities.

_____

How would you let someone who didn't live in your house know that you wanted to talk to him/her if the phones weren't working?

_____

Make a list of homonyms.

_____

Make a list of all the things with which you can write.

_____

Make a list of at least 10 things that could be bought with 50 cents.

_____

Make a list of things to do with a stack of magazines.

Fluency Tasks

Make a list of at least five things for which the back of your notebook could be used.

_____

Make a list of vitamin C sources.

_____

Make a list of things that have caused wars.

_____

Make a list of sticky things to eat.

_____

Make a list of checkered things.

_____

Make a list of musical instruments with strings.

Fluency Tasks

Make a list of yellow things that are soft and smell good.

_____

Make a list of animals that climb trees.

_____

Make a list of things that circulate.

_____

Make a list of things that are shaped like diamonds.

_____

Make a list of things that have a rectangular shape.

_____

Make a list of things that are bought flat but take another shape when used.

Fluency Tasks

Make a list of round things that are larger than a basketball.

_____

Make a list of cartoon characters.

_____

Make a list of people who have been in the news in the past year.

_____

Make a list of things that would occur without carbon dioxide sources.

_____

Make a list of reasons it is good to have sunshine.

_____

Make a list of things that are green and prickly.

_____

Make a list of things that are brown and warm.

Fluency Tasks

Make a list of things that are white and cold.

_____

Make a list of things that are frozen.

_____

Make a list of things that are sparkly.

_____

List five uses for a hat.

_____

Make a list of all the words you can think of that mean something like "light."

_____

Make a list of things that make crunchy sounds.

_____

Make a list of things that are icy and smooth.

Fluency Tasks

Make a list of things that smell good but taste terrible.

_____

Make a list of things sold by volume.

_____

Make a list of things sold by ounces.

_____

Name at least five nocturnal desert inhabitants.

_____

List other words that are similar in meaning to the underlined words:

I saw a <u>voracious</u> tiger.

A soup can came <u>crashing</u>.

Dimension One: Gathering and/or Isolating Data

FLEXIBILITY

Flexible thinking is using the various possibilities produced in fluent thinking behavior by forcing associations not usually considered in such a context. A person who thinks flexibly may redefine mental sets. Flexible thinking is seeing something from another perspective. When asked, "What else is possible?" the learner is being asked to force new associations.

For example, if asked in what other ways could a pop bottle cap be used, a flexible response might be to use it as a boat for a family of ants. When asked what one worn-out tennis shoe could be used for, the learner might respond, "As a planter."

The purpose of flexible thinking is to promote responses not normally found in the realm of accepted knowns and associations. Flexibility allows the invention of new or yet undiscovered possibilities. It allows the use of something considered obsolete. Flexibility is seeing things another way. It requires a shift in perspective. It calls for another direction in thinking.

Flexible thinking in school content is apparent when the learner takes a different approach to solving a problem, or shifts the direction of thought. For example, the learner who solves the problem of how many rectangles there are in a design might give various responses, depending upon different ways of looking at the design. All responses are correct if there is a rationale. The numbers 52 + 9 might be 511 if the learner were able to perceive it in such a flexible manner.

Flexibility Tasks

Think of some ways to determine how many teaspoons are in a tablespoon, a cup, and a pint. Do not use any measuring spoons or measuring cups.

How many sugar cubes would it take to fill a pint-sized milk carton?

E F I

How can you construct a way to measure the weight of toothpicks, paper clips, and t-pins: using tuna fish cans, some wire, and a coat hanger?

How would you find the thickness of one sheet of paper?

List at least five useful ways to use chewing gum wrappers. Do not include the concept of containing gum.

If you were going to improve the cereal box to make it more interesting to read while you ate your cereal, what would you do?

Flexibility Tasks

Think of some ways to re-use all the paper used every day at school.

D	F M	C R I I

Enough garbage and trash--some of it biodegradable, some of it not--is thrown out every day in the United States to make a five-pound pile for every single person every day of the year. Write a paragraph with some possible solutions for this problem. (A good reference for ecology is *Save the Earth: An Ecology Handbook for Kids*. New York: Alfred A. Knopf, Inc., 1974.)

Write sentences that use the word *shot* in each of the following contexts:

basketball

hunting

driving a car

munitions

hanging a picture

writing an essay

The Hippocratic Oath

libation

List as many things as you can that the following symbol can mean.

	F	
D	S	C
	M	

Flexibility Tasks

Make four . Make them the same size and shape. Cut them out. Show how to make a square, two rectangles, a larger rectangle, two triangles, and a diamond.

Invent an air-tight bag for potato chips. Make sure it can be opened with one hand.

Make a list of things that cannot be predicted.

List 15 ways to use a surfboard.

List ways to use an empty soup can.

Make a list of ways to press your clothes without using the concept of electricity.

Flexibility Tasks

Redesign your classroom without using squares or rectangles.

Think of a way to use a balloon and a pencil for a game to teach math to young children.

List 15 ways to use a surfboard that don't include the ocean.

Make a list of at least nine ways to measure the length of your room without using a standard measuring device.

List 10 ways or things you could use to ride the waves.

List some ways you could use a basketball, baseball, and softball for a math project.

Flexibility Tasks

Make a list of at least eight ways you could use a piece of foil, a cork, and something of your choice for an art project.

Make a list of ways to use a cereal box, a cube, and a Sunday comic strip for a reading lesson.

How would you use a tape recorder, a vase, two rulers, and a piece of felt at the same time?

Think of at least seven ways to use an empty box. Do not use the concept of holding something.

Think about different ways to send a message to someone across the room; across the continent; across a football field.

List all the ways that you would be affected by a blizzard.

Flexibility Tasks

Design a timepiece that uses base five.

Make a list of things that are small and that progressively become larger.

Make a list of things you would need if you were going to spend two weeks in the Arctic. Make a list of things you would need if you were going to spend two weeks in India. Make a list of things that you could use in both places by changing the way you use them.

Make a list of words that begin with the letter *b*, that have more than seven letters, and that can be used as transportation.

Make a list of places you would put something that is very valuable to you.

Write a sentence using the ideas: sidewalk, crack, rainstorm, siren. Write at least three more sentences using the same ideas but using the words in a different order in the sentences.

Flexibility Tasks

Think of four ways to use the word *bills* in a sentence.

D M S T

Make a list of words that rhyme with ethylene. Think of at least three ways to use the words *ethylene* and *Evangeline* in a sentence.

Find seven ways humans have developed to store food so that food that is in season in May is still available to be eaten in November.

Write a sentence using *dehydrate* and *previse*. Think of at least four other ways to use the words.

Find several ways these words are alike:

little, brittle, brick, light, limp

E F R
D M C

Think of at least three sentences that use the words above in relationship to physiognomy.

Flexibility Tasks

Write at least five definitions for the word *justice*.

Think of at least four ways to use the words: *pice, pied, pilchard,* and *ping* in a sentence.

Connect the unconnectables. Think of an idea for using the three categories together. Example: choose a word from column A, B, and C. Think of a way to use all three items at the same time.

A	B	C
eraser	orange	soccer
plant	light	lime
container	scissors	Plasticine
bush	TV	watch
nickel	tar	potato
hook	rock	cylinder
sand	strings	glass
magnet	pins	foil

Make your own list. Give it to a friend. Generate as many uses for the forced associations as you can.

How would you use a vase for something other than holding a flower?

Flexibility Tasks

Find and write 14 various definitions of the word *walk*.

_____

How are crayons and bicycles alike?

_____

How are *ate* and *ape* alike?

_____

How could you use a screwdriver and a pair of pliers to let someone know you were lost on an island?

_____

If you went on a picnic and forgot the can opener, think of at least three ways you could get the can of beans and the pop bottles open.

_____

Think of at least four ways to use a fork and a piece of screen as a musical instrument.

Flexibility Tasks

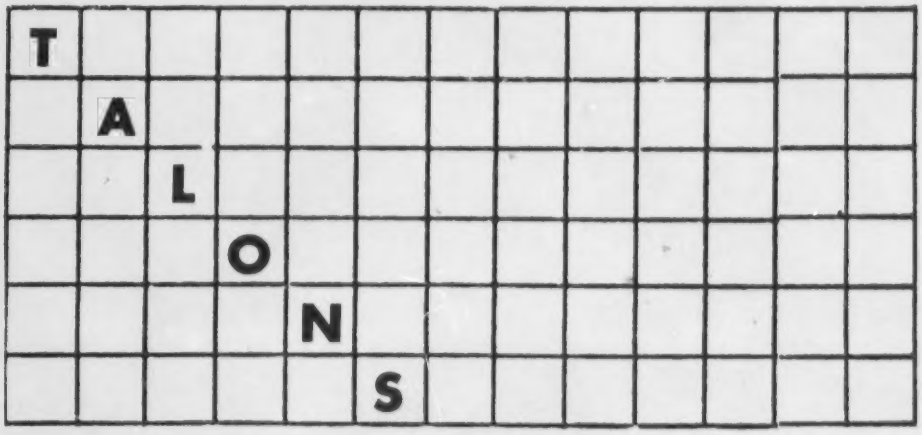
In what ways could you use an empty cylinder potato chip container to entertain a child?

Think of at least four different ways to keep your shoes on, other than shoe strings or buckles.

Name 10 things the Indians invented that are still being used throughout the world today.

Write at least 10 words that begin with the three-letter word that provides heat and light for our earth's atmosphere.

Fill in the crossword blanks with letters that spell the names of birds.



Flexibility Tasks

How many combinations of three letters can you get using the letters:

M, A, and N?

Predict how many more combinations of letters you could get using one more letter of your choice. Test your prediction. Write a rule that explains this exercise. (This idea is adapted from "How Many," *Aftermath III*. Palo Alto, California: Creative Publications, 1975.)

Find a word that fits all of these meanings:

1. piece of metal
2. to say something precisely
3. to secure

Find a word that fits all of these meanings:

1. short, swinging blow
2. curved metal device
3. to snatch
4. to become dependent upon

Find a word that fits all of these meanings:

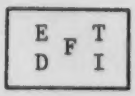
1. to hurl, knock
2. to do quickly
3. foot race
4. punctuation mark

Flexibility Tasks

Think of a way to write the number 1,000,000 without using any zeros or spelling any words.

Think of at least four sentence that you can write without using words. Examples: O I C U R M T. U R A Q T.

If there were no right angles, how would the structure in which you live change?



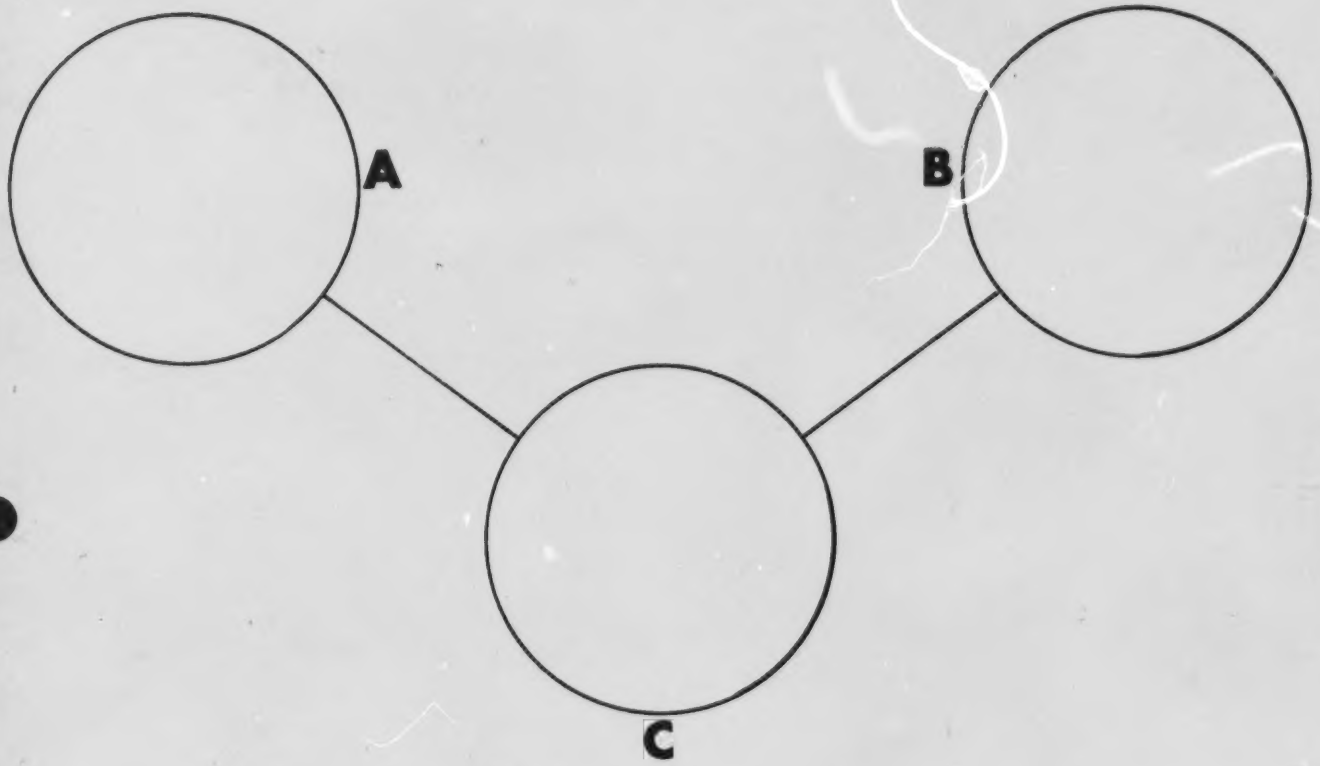
Using a bandaid and a magic marker, measure the growth of a fingernail over a twelve-day period.

Think of four uses for paper clips. Do not include the concept of holding paper together.

Make a list of 10 words by using letters from a six-letter word that contains the vowel *i* and a consonant blend that means *to change*.

Flexibility Tasks

1. Put the name of an organic product in circle A.
2. Put the name of a throw-away item in circle B.
3. Think of a connection between A and B that you could put in circle C.



Write a comparison of your life-style, foods you eat, the living conditions you have, etc., to that of the characters of Laura Ingalls Wilder's book, *Little House on the Prairie*.

Find a way to use a piece of equipment that Charlie Scot uses in making a living explaining longitude and latitude of the world spheres.

PERSEVERANCE

Perseverance is the creative thinking behavior of seeing a task through to completion, or perhaps to the satisfaction of the learner. The ability to discipline oneself rather than be disciplined by external forces (be it teacher, parents, or peers) is the internal responsibility for setting one's goals and seeking to fulfill them. Perseverance finds itself a part of creative thinking skills because, without the discipline to set goals and to follow through to self-satisfaction, the would-be creative learner lacks the important ingredient of "stick-to-itiveness." Without internal rewards and pleasure for setting a goal and achieving it, the learner eventually runs short of the external motivators to accomplish whatever is before him/her.

Perseverance becomes a part of school curriculum as learners are asked to take responsibility for making their own decisions. Self-evaluation by learners gives them responsibility for what they have done. When learners are asked to make their own decisions relative to whether they have done enough, they are being asked to take the responsibility for their own behavior.

Examples of teacher responses that encourage perseverance are difficult to explain. When a learner asks how much has to be read, or a similar question like, "How much do I do?" or, "Is this long enough?" the teacher response might be, "How much do you feel you need to do?"

The levels of responsibility that are possible in a creative thinking classroom are explained in the section "Teacher-Learner Responsibility" in the first part of this guide.

The chart below indicates that the option of *how much* isn't given to the learner until the third level.

Learner Responsibilities:	Criterion V: Expertise
	Criterion IV: Variations on a Task
	Criterion III: Self-Initiated Quality
Teacher Responsibilities:	Criterion II: Do a Task Accurately
	Criterion I: Engage in a Task

When asked if a product is good enough, the teacher response might be a question. "Are you satisfied with it?" "Could you do anything more with it to make it better?" "Would you change it in any way?" In the above teacher responses, the responsibility is returned to the learner. These responses become appropriate with levels of responsibility III, IV, and V.

The important role of teacher with regard to developing learner's perseverance is to allow the learner to be his/her own judge and to take responsibility for his/her own behavior. Until given the opportunity to assume responsibility, the learner need not learn to do so.

Certain assignments of classroom tasks might call for perseverance. Solve this riddle:

Three tumblers are placed on a table with the center one upside down and the others right side up. You are allowed to turn any of the tumblers over, but you must turn just two at a time. Can you do this so that all three finish right side up?

Research the population of the state in which your mother lived the year she was born, and compare it to the population of the state in which you presently live. Compare the growth rate of both states (or growth rate over a period of time). Research the causes for growth. Show your findings on a wall chart.

Two rulers are fastened at their ends so that they can be pivoted. They may be turned at either 90-degree or 180-degree angles. No other angle is permitted. There are but three possible configurations. Figure out how many configurations are possible with three rulers.

Outline a history of favorite sports, recreational areas, school subjects. Include in the history at least five of the following categories of information:

1. Statistics
2. Successful or notable people
3. The precise time of origin, as best known
4. Activity in that area in a specific 10-year time line
5. How the focus relates to something else
6. A prognosis regarding the next 100 years

Make a list of 52 ways to use flour.

Unscramble the following words: E S S

roccoelid	eeiatts	dbiirumgnmh
satet	enifsse	deaemoiselml
ytidnetsr	yoogleg	nvoatio

Perseverance tasks are not to be confused with busy work. The objective of perseverance tasks is to provide the learner with opportunities to explore or find out about meaningful data while developing self-initiated responsibility and pride.

Many commercial items are available that provide an abundance of perseverance tasks. Some of the items are printed on the following pages. Remember, however, before presenting a task to the learner, consider how meaningful it is. The objective is not to provide busy-work tasks, but tasks that teach perseverance and self-initiated responsibility.

Perseverance Tasks

Classify in at least three categories:

fork, toothpaste, noon, moon, three-ring circus, pen, wheel, rocking horse, swing, gondola, tricycle, screwdriver.

Trace the origin of a shoe, of a piece of paper, of a pencil, of a candy bar.

What are some things that might weigh more than toothpicks or paper clips, but are similar in size? Construct a way to measure the weight of toothpicks, paper clips, t-pins, etc. Predict those that you think will weigh more. Weigh them. Chart your predictions and the exact weights.

Write a new opening scene to the movie, *The Sting*.

Research and diagram the circulatory system of a human and of a bird. Chart the comparison.

Research the where and how of the first movable printing press.

Perseverance Tasks

Research what events were occurring in Mexico, Canada, and one other country of your choice during the years of Watergate.

In what notorious way is the French Civil War of 1648-1652 remembered by many historians?

Find at least three pieces of published literature with the authorship of a woman but credited to a man.

C M U

Make a comparison of authors' styles and similarities in writing. Notice the treatment of the same subject by different authors.

Find opposing views of a news event that is covered by different newspapers.

Make a comparison of how people were transported, the music they heard, the arts, the political events, and the economic sources of the people living in 1800-1820 to the people living in 1900-1920 in one of the original thirteen colonies.

Perseverance Tasks

Read a historical novel. Make a time line of the main events.

Buy some mealworms from a pet shop. Besides having a contest with a classmate to see which mealworm goes how many centimeters in five minutes, find out if the mealworms prefer wheat flakes, corn flakes, or lettuce.

Get up and run a mile every morning.

Learn to do something you think you can't do.

Build a crossword sentence. (This idea is adapted from *Writing Kabyn.* San Diego, California: Kabyn Books, 1978.) Example:

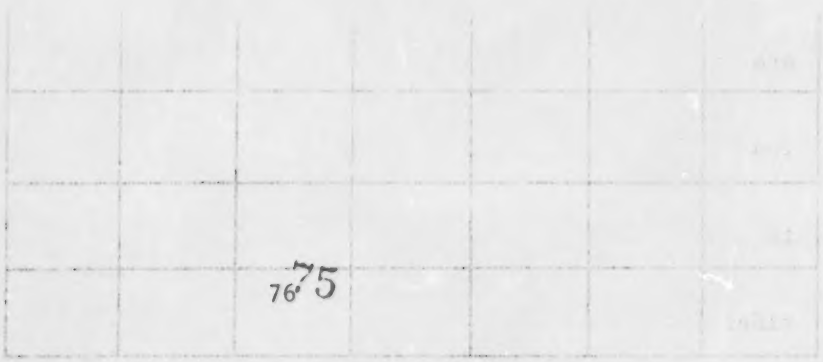
Horses	run	free.				
are						
fun						
to						
ride.						

Perseverance Tasks

Rewrite a scene from Shakespeare's *The Tragedy of King Lear* so that a fourth grader can easily read and understand it.

Make a cassette tape and read-along storybook about Harriet Tubman for children in kindergarten.

Be a comparison shopper. Buy the same 10 items at a grocery store every month over a five-month period. Report the rate of price increase or decrease. Chart the percentage. Predict the rate of increase/decrease over the next 12 months.



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Dimension Two: Doing Things with Data

ELABORATION

Elaboration is the creative thinking behavior of adding onto or embellishing an idea, or expanding upon existing knowledge. For example, the simple sentence, "A cat ran," can be elaborated on in ways to make it more descriptive. The sentence might read, "A scrawny, yellowish-orange alley cat ran haltingly away from the car's headlights."

Elaboration does not necessarily call for any changes. By adding onto a drawing, a story, a sentence, or ideas, for example, the perspective might change. Most likely the drawing, story, sentence, or idea becomes more complex and *detailed.* Whether or not it changes perspective is secondary.

The elaboration might provide a more specific and precise thought or picture. The purpose of elaboration is to expand or stretch. Elaborative behavior for some individuals is apparent with the number of questions they ask, the detailed answers they give, the way they sign their names, and the way they adorn themselves.

Elaboration is a creative thinking skill because it necessitates that the learner reason about where, how, and what details or expansions can be made on already acquired knowns. Elaborative thinking can be used in school content whenever the learner is called upon to add details, to ask questions, to expand upon existing knowledge. For example, elaboration tasks in spelling might include adding prefixes and suffixes to root words, writing one sentence using five of the week's spelling words, and so forth.

A familiar elaboration exercise called progressive creative writing is passing a piece of paper to another person with instructions to add another sentence or group of words to already existing sentences. Elaboration is the behavior when a doodle is made from the initial of a name. Doodling is elaborative behavior.

Elaboration Tasks

The number 311 contains the digits 3, 1, 1, and when added together these numbers equal 5. Find other numbers whose digits add to five

---

If tulips have bulbs, what do sugar beets have? What do carrots have? What do peanuts have?

C
M M R

If quail come in a covey, what do elephants come in? What do bees come in? What do wolves come in?

If Eskimos live in igloos, what do some Navajos live in? What do some Apaches live in? What do some Tewas live in?

Illustrate these idioms:

in the dog house

wound up tight as a clock

have the blues

pick up the room

frog in his/her throat

heart sank

kick back

raining cats and dogs

hit the road

Find at least five more idioms. Illustrate them.

Elaboration Tasks

What is the proper taxonomic classification sequence for the horse? N M S

How would you modify the paper bag to make it more durable and more convenient for heavy, bulky purchases of groceries?

The Burma-Shave company used to advertise their product by a succession of signs along the roadways. What has happened to that historical, and sometime quaint, form of advertising in America used by Burma-Shave? Research the sophistication of advertising.

Here is an example of a jingle used by Burma-Shave in 1935.

YOU KNOW
YOUR ONIONS
LETTUCE SUPPOSE
THIS BEETS 'EM ALL
DON'T TURNIP YOUR NOSE
BURMA-SHAVE

Make up your own Burma-Shave jingle. Talk to someone who remembers the Burma-Shave roadside signs.

(A good reference book is: Rowsome, Frank. *The Verse by the Side of the Road: The Story of the Burma-Shave Signs and Jingles.* Stephen Greene Press, 1965.

Elaboration Tasks

List phrases or words to complete these sentences.

I feel sad when _____.

Something that bores me is _____.

When I am 40, I shall be _____.

If only _____.

Strangers make me feel _____.

What embarrasses me is _____.

When I try something new for the first time, I _____.

What makes me furious is _____.

Something I would do again is _____.

An important thing to me is _____.

I cry when _____.

Something funny that happened to me is _____.

Laughter is the color of _____.

Silence is the color of _____.

Joy is the color of _____.

To be first is _____ important to me.

Winning is _____ to me.

I admire people who _____.

Something I learned to do that I didn't think I could do is _____.

When it is raining I like to _____.

Ways I help around the house are _____.

I feel important when _____.

The sound of wind blowing through the trees makes me feel _____.

The sound of ocean waves breaking makes me think of _____.

The aroma of fresh-baked cookies makes me _____.

Foods I associate with good times are _____.

The best time of the day for me is _____.

When something doesn't go the way I hoped it would I _____.

When I get scared I _____.

Being by myself is _____.

Being with others is _____.

I feel creative when _____.

Elaboration Tasks

Harmonious Sentences with Homonyms

Directions: Below is a list of some homonyms. See if you can write 15 more.

road-rode	write-right	wait-weight
1.	6.	11.
2.	7.	12.
3.	8.	13.
4.	9.	14.
5.	10.	15.

Directions: Write one sentence using each set of homonyms in the content.

Example: Little children skillfully rode their Shetland poinies down the rocky road.

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

13.

14.

15.

Elaboration Tasks

Talking and Writing Double Sentences*

Directions: Students are to write two sentences that contain each of the ideas found in the lettered set. Students may use these ideas in a variety of ways. As they share their sentences orally, various patterns of sentence structure emerge.

D M R S

Set A: (bellowing, smoke stacks, pollution, economy, transport, smog, anger, weary, pursue)

Example. Wearily, the upper-middle class professional daily pursued her career by driving through the maddening morning rush-hour traffic to the lovely air-conditioned office. The tedious drive to work was complicated by the evidence of billowing smokestacks, which daily polluted the smog-ridden city, providing the paradox of wealth and destruction via the city's resources of economy.

Set B: (devastation, nature, control, power, helpless, population, turmoil, brilliance, supreme)

Set C: (chains, efficient, purchase, midnight, hunger, prepare, nutrition, change, plastic)

Set D: (voyage, rodents, displaced, immersion, contain, recoil, founder, ocean, vessel)

Set E: (diplomat, tension, junket, pacify, disharmony, world, brief, provide, contain)

Variations for building double sentences are:

a. writing sentences that have association with each other
b. building the most complex sentences
c. building two sentences with the fewest number of words

*These ideas and others for building and writing sentences are explained in more detail in *The Writing Kabyn*, published by Kabyn Books.

Elaboration Tasks

Emotions are a part of us. Crying is an emotion. People cry for different reasons.

Read the poem, "It's All Right to Cry" by Carol Hall. Look at the pictures in the book *Free to Be You and Me*, Free to Be Foundation, Inc., McGraw-Hill Book Company, 1974. You will find the poem, the pictures, and the song, "It's All Right to Cry," on pages 92-95 of this book.

After you have read the poem and song, you might write you own poem and make your own collage of pictures expressing that emotion.

Find other poems or song lyrics that express other kinds of emotions.

Make up similes and metaphors for these words. D M R T

A star is like a jewel.

The lake was as smooth as glass.

The wind blew like _____.

The performance was like a _____.

The balloon lifted as a _____.

The toy plane soared like a _____.

The kittens devoured the milk like _____.

I was so embarrassed that I looked like a _____.

That joke went over like a _____.

Make up your own similes and metaphors. Put them on a card and share them with your classmates. Illustrate at least five of them.

How many ways can you spell your favorite color?

Elaboration Tasks

If you were asked to improve the lighting system in your classroom, what would you change or add?

If you were going to design a drip-proof ice cream cone, what would you do?

Devise a schedule so people who were born in a certain month would buy groceries on a specific day to cut down on the long lines in grocery stores.

Put five numbers on the page. Make a design that connects all five numbers.

Make a picture from this shape. Add details to this drawing to make it more interesting.

Elaboration Tasks

Design a desk divider or cubbyhole that you can use for more privacy in your classroom.

Make a number pretty.

D F S T

Pick a tall letter. Make it larger. Make it into an interesting design.

Draw a triangle. Add details to change it into a sketch of something you might find in your home.

Extend the line:

2 4 6 8 ___ ___ ___ ___ ___

C N S S

Extend the line:

N M L K ___ ___ ___ ___ ___

C N S S

Elaboration Tasks

Arrange these shapes into a new design:

Make a maze from your middle initial.

Draw a picture around your thumb print.

D F S

Collect some leaves and flower petals. Make a picture. Write a caption for what they are doing.

Make a picture using the first five letters of a headline in a newspaper.

Elaboration Tasks

Cut out pictures from a newspaper. Write a story about what you think might have happened.

_____

Cut out a serious advertisement. Write a funny caption that makes the ad seem ridiculous.

_____

Make a number rule from your birthdate.

_____

Fill in the blanks to make a sentence.

Happy _____ _____ _____ _____ _____. Trouble _____ _____

_____ _____ _____ _____.

_____ _____ _____ was _____ _____ _____.

Angry _____ _____ _____ _____ _____ _____; therefore,

_____ _____ _____ _____ _____.

_____ _____

Make a pattern of five peoples' hands. Make a mobile design.

Elaboration Tasks

Write a commercial for a pet food.

Write a variation to the lyrics of "Fly Like an Eagle" by the Steve Miller Band.

Add variations to the latest disco dance.

Creativity with your Thesaurus: Brain Power

Directions: Use your thesaurus to find the following words. Write a sentence that contains the word in the part of speech requested. Add any necessary affixes.

discontent as a noun

discontent as a verb

discontent as an adjective

mineral as a noun

mineral as a verb

mineral as an adjective

permit as a noun

permit as a verb

permit as an adjective

perfection as an adjective

to perfection as an adverb

request as a noun

request as a verb

request as an adjective

Elaboration Tasks

Thinking and Writing Skills

Directions: Make a list of the following words.

Abstract Nouns	Concrete Nouns	Action Words
1. fatigue	1. man	1. drove
2. retirement	2.	2.
3.	3.	3.
4.	4.	4.
5.	5.	5.

Choose a word from each column and arrange all three words into one sentence. Add affixes when necessary. Change the verb form to fit your sentence.

Example: Fatigue drove the weary man to retirement.

Try to use all the words in at least one of your sentences. Did you consider forcing new connections between words not typically considered?

1.

2.

3.

4.

5.

6.

Choose one of your sentences above and write a five-sentence paragraph that includes your sentence.

Elaboration Tasks

Start with the word *ran*. Change the word by writing the appropriate answer.

Father is a man.
When you go in the sun, you can get t.
Mother cooks with a _____.
The past tense of run is _____.

Start with the word *gun*.

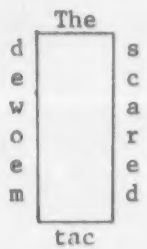
When you go to the ball game, you buy a hot dog on a _____.
Going to the beach can be a lot of _____.
A safety rule is walk, do not _____.

Start with the word *car*.

Something gooey is _____.
I can't get the lid off the _____.
It wasn't close, so it must have been _____.

Make up your own set of sentences. Give them to a friend to try.

Arrange a four-word sentence around a geometric shape.



Arrange a ten-word sentence around a geometric shape.

Now invent your own pattern.

Arrange a six-word sentence.

Elaboration Tasks

Make these words look like their meanings.

swallow

stretch

zero

swim

leader

fuzzy

bright

smile

rainbow

swing

topple

soft

tingle

(These ideas are adapted from "Wacky Words," *Arrow Book of Brain Teasers*. TAB Books, 1959.)

How would you decorate or change these items to make each more attractive or useful?

drinking fountain

TV antenna

trash can

milk carton

stop lights

gas station

drains in the sink

lunch trays

faucet

chalkboard

soup dish

sidewalks

pencil sharpener

clothes hanger

rulers

bicycle racks

Elaboration Tasks

Geometric Feelings--Or, Do You Feel Square Today?

Draw a geometric shape to illustrate the feelings of these words.

cuddly	spring
zingy	straight
strict	steep
confused	soft
pressured	high
worries	laughter
smile	excitement
collapse	

Find three different meanings for *mantle*. Draw a sketch and provide a description of each.

There is a word in most standard dictionaries that is defined in at least 20 ways. When you find the word, use it as the root for at least 10 compound words of your invention.

Get a road map. Using magic markers, make a pleasing design by coloring the spaces bordered by state or city-maintained highways.

Elaboration Tasks

Make a picture from the design below.

Write a paragraph on the importance of a five-letter word that contains the letters: *s*, *a*, *s*, *r*, and *g*, otherwise known as graminae.

In your paragraph include at least two of the following ideas:

hamburger

camouflage

cereal

watershed

ice cream

Dimension Two: Doing Things with Data

COMPLEXITY

Complexity necessitates the behavior of making order out of chaos. Individuals who find themselves involved in what appear to be complex tasks are able to sort through the intricacies of the task, ask appropriate questions, and find appropriate solutions or management systems for the complexity.

The behavior of becoming involved in complex things with the intent of seeking order is characteristic of the learner who is drawn to complex situations. Examples of this behavior are learners who find the path in a maze, the answer to a complex, several-stepped math problem, and the solution pattern to a scientific hypothesis.

Preference for complexity is a creative thinking attitude evident in any task that demands *in-depth awareness and reasoning*. For example, management of chaos or complexity is a behavior that initiates the process of organizing the steps to, and methods for solving a problem. The problem might be to find a process by which to select a chair for the scholarship committee, sorting and categorizing possible solutions to the problem of increased teen-age alcoholism, the method for alphabetizing 20 words all beginning with the letters *at*, the planning and putting together of a school annual.

Complexity Tasks

Put together a boxed and unassembled model car.

Put together a 100-piece puzzle.

R
N F S

Change the word *jacket* to the word *socket* in five words.*

jacket

1. _____
2. rocket
3. _____
4. _____
5. socket

Now, make your own puzzle. Give it to a friend to try.

*Doublets are found in *The Unabridged Lewis Carroll.*

Taxonomies

Make a list of taxonomies.

Describe two taxonomies.

Create a taxonomy of *feelings*.

D M S

Create a taxonomy of the social structure of the classroom.

Create a taxonomy of dominant colors.

Complexity Tasks

Make a chart that presents the content *and* implications for living things of city air v. country air.

Make a display of the effect of soft drinks on tooth enamel. Include a narrative that explains the results of the effects over an expanded time period such as five years, 10 years, etc.

Use sagacious and police dog in one sentence. D M S

Fold an equilateral triangle from a circular piece of paper. How would/could you check to see if it is equilateral?

What is the square root of 6, of 9, of 10? What can you find out about the square root of 2?

Do cows in fact have a double stomach? Write a paragraph explaining the process of turning grass into milk.

Complexity Tasks

In your opinion, what impact and inference for the future of medical science and the use of spare parts does the story *Coma* have regarding society's trust in donor banks?

Find a capital letter whose image by rotation through a half-turn looks the same as the original letter.

C F T

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33 = 3 x 11 = 11 + 11 + 11 = 10 + 11 + 12. (10, 11, and 12 are consecutive numbers)

Using multiplication and addition, find some ways to write 72 with nine consecutive numbers. (One of those numbers will be eight.)

Try the products of the numbers 3 x 3. How many consecutive numbers can you find?

Try the numbers 30 and 28.

Is there an even number greater than two which could not be expressed as the sum of two primes?

What number pattern do you get when you take 37 times the multiples of three?

37 x 3 = 37 x 6 = 37 x 9 = 37 x 12 = 37 x 15 = 37 x 21 =

and so on.

Complexity Tasks

There are little words living inside the contents of the bigger words. How many little words can you find?

For each word, only use the letter the number of times it is found in the bigger word. To make this task a bit more complex, begin each new word with the last letter of the former word. (Example: *sip*, *pit*, *ten*, etc.)

photosensitive	cauliflower
scopolamine	botulism
typography	luscious
wearisome	fraternize
defoliate	academician
clairvoyance	perseverance

By the way, do *you* know what the big words mean?

Write an acrostic using your name, your favorite hobby, the name of a planet, a place you like to visit.

Write down any three-digit number. _____

Write it again so that you have a six-digit number. _____

Divide the six-digit number by 7. _____

Divide the answer you get by the number 11. _____

Divide the answer by 13. _____

What do you have now for an answer? _____

Explain why that happens. _____

Invent a five-step sequence that works in a similar way.

(This idea is adapted from "Number Magic," *Aftermath III*. Palo Alto, California: Creative Publications, 1975.)

Complexity Tasks

Make a list of 10 words by using letters from a six-letter word that contains the vowel *i* and a consonant blend and means *to change*.

Write a definition for a word that you can make from the following letters when rearranged: *s*, *p*, *t*, *s*, and *e*. Your definition cannot refer to geography or climbing.

Make your own amulet. What is the purpose of your amulet?

Make a cryptogram.

The predictor and science-fiction writer Arthur C. Clarke has said, "The first intelligent computer will be the last machine man will need to make--and quite possibly the last that he'll be permitted to make." Discuss the implications of such an invention.

Each of the letters in this addition problem stand for a number in the set: (3, 4, 5, 6, 8, and 9). Find which digit represents which letter.

PAY + DAY = YES

Make a subtraction word.

Complexity Tasks

Find the narrowest point in the Pacific Ocean. Find the population of your state. Find the height of the tallest mountain. Arrange the numbers into a subtraction problem. Arrange the numbers into an addition problem. Find the difference between the two problems.

Research the origin of the measurements *foot* and *yard*.

What is the perimeter of your foot?

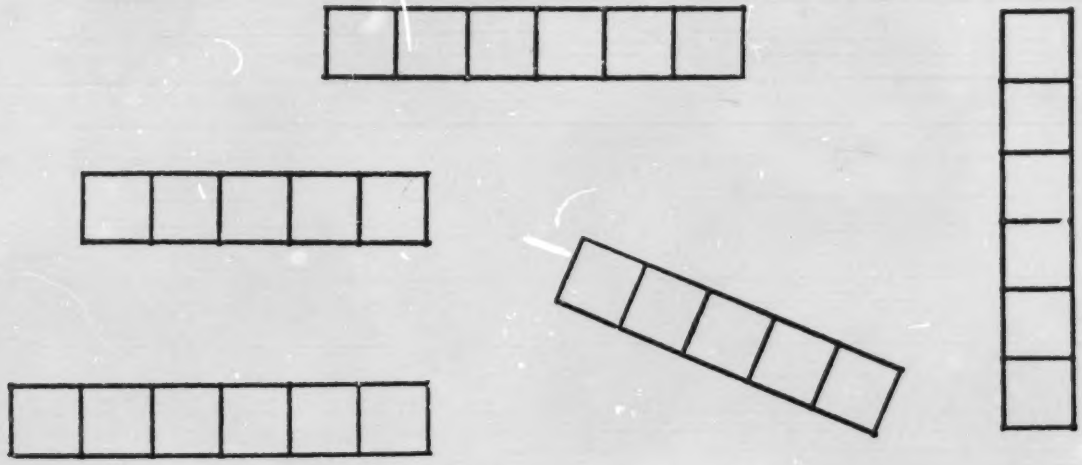
Which brand of paper towel has the most area? How can you display your results so others will know what you have found? Make a chart or other visual aid.

Often we have to deal with dilemmas or conflicts. Read Robert Frost's poem, "The Road Not Taken." List or discuss situations requiring a choice between one or more available options.

Complexity Tasks

Find the onomatopoeia (sound words) in this set of letters and fit them into the shapes below.

(c, b, e, i, g, l, a, c, h, r, u, m, c, h, e, i, t, n, l, e, w, o, l, l)



Five or more members of your class form a group. Each member of the group is to design one room of a school instructional area. After each member completes the design, come back together and arrange your designs into a larger design.

Think about the possible energy sources which may be used when you are in your 30s. Write a narrative on the possible changes in society these energy sources will effect. Make a comparison of today's energy sources, their effects on today's society, and those you predict for the future.

Do a study of the coastal development in Southern California. Research how and when the development began, and what the original developers' plans were. Do a projection of the appearance of the coastal area in 15 to 20 years.

Dimension Three: Doing Things Differently

The creative thinking skills of the third dimension--courage, curiosity, imagination, and originality--all require a special attitude and behavior by both teacher and learner. Each teacher must decide how much he/she wishes to become involved with the seemingly fuzzy, ethereal dimension. It becomes a personal, intimate, and sensitive relationship between learner and teacher. Learners left to their own examination of their conscious thoughts become familiar with their intimate insides.

The phrase, "to really get inside one's own thoughts and inside one's own skin," might be appropriate to the behaviors of the third dimension.

To dare to think, to wonder, and to reason causes discomfort. But it also requires some trust and being at ease with self. Somewhere, on some fine line, the teacher can lend support and understanding to the learner. The learner is essentially alone with self in this third dimension.

COURAGE

Dimension three is more difficult to explain in terms of school content behavior. Certainly, originality, imagination, and curiosity are vital to creative thinking. All three of these behaviors involve some measure of risk and demand some degree of courage.

Courage is apparent when the learner moves away from the predictable or comfortable patterns for thinking and behaving (whether privately or publicly) and entertains what might be or could be. Sometimes the individual who dares to wonder and to contemplate alternatives beyond the parameters of the familiar is viewed with disbelief or ridicule. The person who continues to think and behave in unfamiliar ways is often courageous. An individual who dares to share with others the thoughts or inquiries that challenge unfamiliar ideas or concepts takes the chance of being labeled as different. To dare to think of possibilities that might exist, and wonder how to make them so, is a risk.

As educators, we have a responsibility to encourage the learner to risk; but we cannot invite risk in a setting that is anything less than realistic. It would be unfair to the learner if we encouraged risks and then did not pay attention to the risk. However, to listen does not mean we always accept. The world will question and doubt. This is a dilemma for teachers. We cannot allow cruel situations to occur where they can be prevented. Yet, we cannot fool the learner into believing that going public with ideas that may be considered absurd by others does not have a certain amount of pain involved.

Each educator must decide what to do to ensure a safe, yet realistic, environment in which young learners may go public with ideas. Perhaps one of the best things we can do as educators is to send the learner a straight message and not smokescreen the consequences. We can encourage speaking out and we can send straight messages about what might occur when the learners take risks. In the end, the

learner decides if he/she will be courageous with a thought, and share it with the public. Once the decision is made, the learner has also decided to accept whatever consequences await.

To help the learner understand about some people who have shown courage and dared to be different, it might be helpful to read and discuss the lives of Copernicus, Galileo, Martin Luther King, Jr., Benito Juárez, or others who have made sacrifices for their convictions.

Courage Tasks

Write a letter to the local newspaper or television station about a concern you have.

Write an essay on capital punishment.

Make a list of things about which you have often wondered. Pick one of them and find information to satisfy your thoughts.

Make a suggestion for improving the classroom's system of controlling troublemakers.

D	M	S I

Design a better system for going to lunch, and share it with the class, teacher, and principal.

Design a game to help a younger child learn the reading words in his/her text. Show the game to the teacher.

Courage Tasks

Think of something that you would like to see change in your city. Jot down what you would do to make this change.

What color is: knowing you have a project due and it isn't complete?

What color is: getting what you wanted for your birthday?

What color is: being disappointed that a friend can't come over?

What color is: having to share when you really didn't want to?

What color is: knowing you did something wrong?

What color is: being alone and not wanting to be alone?

What color is: meeting your favorite film star?

Write an essay on the implications of the statement, "Opinion is ultimately determined by the feelings, and not by the intellect." --Herbert Spencer

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Write a story for a person who doesn't know you very well. Share the story with the person.

CURIOSITY

Curious thinking is the behavior of wondering about or contemplating how or why things might or could be. The behavior is a mental exploration of those things within the realm of the individual's sketchy knowledge. For example, a child might be curious about how a clock chimes. He/She might wonder about the chiming and the clock and might proceed to take the clock apart to see how it works. This would be curious behavior.

Another example of curious behavior is to wonder what might happen *if*. Learners might, for example, ponder what might have happened had the Civil War been fought between the East and the West. Curious behavior is not primarily responsible for producing solutions to problems, but rather for producing possibilities. Curious thinking is a creative thinking behavior that might be evidenced in school largely under the label of daydreaming. The learner who drifts away into his/her own silent thoughts may be wondering about those things he/she is curious about.

We can purposely cause curious thinking by asking the learner to be inquisitive about what he/she perceives, reads, or hears. For example, when shown a painting, the learner might be asked to wonder about what is happening in the painting or what might be seen behind the scene of the painting. In science we could ask the learner what might happen if we added oil to a container of water with a floating toothpick. In social studies we might ask what he/she would have heard if witnessing the signing of the Declaration of Independence.

Curiosity Tasks

Focus on one thing you would like to be able to predict. Brainstorm ways to predict this unpredictable.

If you were to debate the pros of nuclear energy, what would your arguments be?

What would you do if you were asked to choose from the ungraded texts and told to make your own objectives and lessons?

What might be happening in this picture?

Diagram a modern convenience, then make improvements or changes that make it more efficient.

If you were to travel to Walachian in the fall, what would you pack to wear?

Curiosity Tasks

If there were no more mandatory school days, what would you do?

In what ways is the Green Mountain state alike and different from the Evergreen state?

How are Collins, Aldrin, Armstrong, and the tenth month of the year 1969 significant to history?

Choose one of these dates in October and write a paragraph about its significance to American history.

October 12--Columbus Day

October 24--United Nations Day

October 31--Halloween

Third Saturday in October--Sweetest Day

October 29--Stock market crash

Describe a list of products on supermarket shelves in a country where people have no teeth.

Curiosity Tasks

Being Scientifically Curious

D M S

Sporks are coming. They are arriving at the numbers of 1,500 per day, 5 days a week, 186 days a year.

What are sporks? Sporks are plastic spoon-forks packaged in cellophane with a napkin and a straw and distributed with lunch to students in school cafeterias.

Ponder the sporks. Students, begin to list all the various ways to use sporks (other than eating with them). What other ideas can you generate? Think about what other things you might learn by developing various tasks to explore with sporks. Set about your task of generating ideas, setting of processes of exploring tasks, and collecting data. Good sporking!

Jot down notes to yourself concerning interesting thoughts, ideas, and facts learned about sporks.

Source: *Science and Children*, Vol. 15, No. 3, Nov./Dec. 1977.

Use a dowel, a cylinder eight inches in diameter, and some clay to tell what time of day it is.

Research and compare how the events of the following dates affected your life.

January 1, 1863--Emancipation Proclamation

January 15--Birthday of Martin Luther King, Jr.

January 19--Birthday of Robert E. Lee

Discuss how the date of January 1 might affect what Robert E. Lee would do and how both dates and events affected what Martin Luther King, Jr. believed.

Curiosity Tasks

A new type of paper is being made that contains nylon. It is very durable. Generate the positive aspects of this product. Generate some negative aspects of this product.

How does a ring of stones measuring 100 feet across, with 28 spokes that cross another pile of rocks in the middle of a circle, relate to Medicine Wheel and the Indians' calendar? Speculate how the Medicine Wheel originated. (A source book for astronomy for children is *The Night Sky Book*. Boston: Little, Brown and Company, 1977.)

Using two paper clips, a four-inch piece of string, scissors, a protractor, a 3" x 5" filing card, a 50-foot tape measure, a 12" ruler, five pieces of 1/4 inch graph paper, and two friends, make a clinometer to calculate the height of the school's flagpole, a telephone pole nearby, and a large tree.

D F S

A large ruminant was ruminating in the meadow. Draw a picture of what was happening.

A roadside sign in the future well may read, "No wheeled vehicles on this highway." Might this mean that the wheel as we know it would become obsolete?

This roadside sign indicates that cars would move by another system. Make a list of possibilities. Design a new form of transportation that would meet the restriction of the sign.

Brainstorm the changes that might occur with the invention of a wheelless car.

Curiosity Tasks

Get an ink pad and some paper. Make a print of each of your little fingers. Keep the fingerprints around for about three months. After three months, take a print of your same fingers. Notice if there is anything different about your fingerprints three months later.

What sounds would you hear if you were in Quinault?

What makes the sky seem blue?

What would happen if you could float like a feather?

What would it be like if people hibernated three months a year?

Dimension Three: Doing Things Differently

IMAGINATION

Imaginative behavior is the contemplation of *what if*. However, unlike curiosity, imaginative thinking does not need a foundation of direct experiences. In other words, a person can imagine about things beyond knowledge boundaries. For example, "How might things have been if the human skeleton were on the outside like on insects?" No one has any information or knowledge about that condition, but one can speculate about it, nonetheless. The speculation is imaginative.

The purpose of imagination is to develop the ability to visualize images of unknowns, to fantasize events or places that might not be, to be able to reach beyond the boundaries of knowns. Imagination is included in creative thinking skills because it is the behavior of those who dare to think and wonder beyond the parameter of exisiting boundaries, the ability to speculate upon the answers or solutions for the unknowns.

Imagination as a creative thinking skill occurs in school when learners contemplate the question of *what if* within school content. For example, what might happen if words were spelled the way they sound to each speller? What might happen if students under 16 years of age weren't required to be in school? How might the history of the United States be different if the auto had not been invented until 50 years later?

Imagination Tasks

What if ice cream cones grew on trees?

_____

What if there were an automatic cash penalty for every untruth spoken?

_____

What might happen if it rained only in February, but every day, all day in February all over the world?

_____

What might it feel like to be choosen for a space flight?

_____

What would you expect to do during a one-day visit with Howard Zehr?

_____

How might it feel to be a piece of mail traveling from Anchorage to St. Louis?

D M S

Imagination Tasks

What might have happened differently in American history if the ERA had been a fact during Amelia Earhart's lifetime?

Suppose there were an underwater civilization in the Pacific Ocean between Hawaii and Japan. What citizenship might these individuals claim and what powers or effects might they have on the Pacific?

What if sugar-glucose had never been developed to the extent that the population almost finds itself dependent upon it?

What if stars hung from string and you could touch them?

What if you could get on a bus and be transported to any planet you desired?

What might the pioneers have said if told that someday there would exist a form of transportation that could carry them from Boston across the Rockies to the West Coast in less than three hours?

Imagination Tasks

How might the sun taste?

_____

What flavor would the Rocky Mountains be if the earth turned to candy?

_____

What would it be like if we had burrows and lived underground like moles?

_____

How big is sadness? How small is trouble? D M R

_____

What is the question to the answer *sandwich?*

_____

How tall is the color yellow?

_____

What would happen if the colors became neon at night?

Imagination Tasks

What color is an orange car on Mars?

_____

What would the earth be like 20 years from now if all the trees vanished today?

_____

Write a story about a day in the life of a penny.

_____

How would it be if everyone were required to ride bicycles within a radius of 20 miles of their home?

_____

What would you do if you were going to live on an undiscovered island for three years?

_____

Tell the story of a candle used to light the White House in Thomas Jefferson's time.

Imagination Tasks

Which is funnier, a roof or a splash? Which is fatter, a missing library book or a broken glass?

_____

What might happen if all the tall buildings in the downtown area sank?

_____

What might the effects be if the President of the United States had an all-woman cabinet?

_____

What would happen if there suddenly were no more televisions or radios?

_____

Write a story about where you might be now and what you might be doing if your great-grandmother had lived in Bangor.

_____

Write a play that makes you the main character of a soap opera on television 80 years from now.

Imagination Tasks

Imagine the smell of popcorn. Imagine the smell of popcorn turning into the smell of cooked bacon, turning into fresh-brewed coffee.

Imagine the flavor of coffee mocha ice cream turning into the taste of toothpaste, turning into spaghetti, turning into a ball of string, turning into the sound of the crack of a hard-hit baseball on its way over the wall of the stadium, turning into a meteorite flashing across the night sky.

Imagine the smell of a rose. Imagine the smell of a rose turning into a kitten meowing, turning into a lion roaring, turning into a siren screaming along a crowded freeway, turning into an ocean of people sunning on the sandy beach, turning into pebbles of sand moving slowing in the desert dunes, turning into caramel boiling slowly over a small flame, turning into a glass of fizzy water.

Dimension Three: Doing Things Differently

ORIGINALITY

Originality is that creative thinking behavior which is unique or novel. In terms of school content, we speak of originality as a behavior that is unique to an individual learner. For example, if asked to name things that are full of holes, one learner might give the response, "The theory that the earth is the center of the universe." If no one else in the room used that response, then that response would be original and unique in that population of people, for that individual.

Original responses are often generated in fluent thinking exercises. The larger the number of responses generated, the higher the probability that an original response will be produced.

Educators can encourage the learner to be original by asking, "What else, what more?" These are the same questions typically asked of learners for fluent thinking responses. We are saying to the learner, "Stretch your mind even more." The original response might be obtained by a combination of creative thinking skills such as fluent thinking, elaboration, complexity, flexibility, courage, and perseverance. The original response may be the first idea that comes to mind. The original response may be the one that will be responded to with, "Wow, I hadn't thought of that!" or, "That is a different way to see it."

A teacher who consistently and reassuringly uses fluent thinking exercises in the classroom necessarily will provide the stimulation for fluent behavior, but the more fluent behavior is produced, the more often original responses are likely to occur. Originality may be the product of the exercise of thinking.

The more learners are asked to think or are placed in situations where they use creative thinking skills, the more likely unique thoughts and ideas will be formed and shared. Therefore, to produce original thinking, teachers must provide for daily experience at thinking fluently.

Originality Tasks

Present an important event in history in your own unique way.

Design a transportation vehicle designed for human beings whose skeletons are on the outside like insects, but are no stronger than eggshells.

Make a collection of one of the items on the following list and invent an interesting way to keep your collection.

string	pop tops	newspaper headlines
matchbook covers	cobwebs	political cartoons
wishbones	famous essays	napkins
pencils		

Design a puzzle or a maze for a friend to do. D F S

CREATIVE THINKING AND CREATIVE PROBLEM-SOLVING

In the narrative part of this manual, reference is made to preparing learners for problems they will face in their futures. By providing the learner with creative thinking skills, we give him/her a tool with which to perceive tasks and ideas in various ways, which in turn allows the learner to be able to find more than one solution process. The learner who is given the skill to think and behave creatively regarding classroom curriculum, possibly will begin to relate those skills to other areas of his/her life.

Creative thinking skills can be organized and presented in such a way as to provide a problem-solving process which the learner can adapt and implement in solving more complex problems. This process is useful for learners in solving curricular tasks; however, it is also useful as learners discuss and solve problems of everyday relevance and problems of futuristic nature.

The process of solving a problem using the creative thinking skills is referred to as creative problem-solving (CPS).

The process of creative problem-solving is viewed by the author as one that is attainable only to the degree that creative thinking skills have been internalized by the problem-solver. There are at least seven steps to solving a problem using creative thinking skills. The creative thinking skills are used throughout the problem-solving process.

KEY

Aw.— Awareness
Fl. — Fluency
Flx. — Flexibility
Per. — Perseverance
El. — Elaboration
Com.— Complexity
Cour.— Courage
Cur.— Curiosity
Cr. — Creativity
Imag.—Imagination

CREATIVE THINKING
AND
CREATIVE PROBLEM-SOLVING

Steps in Creative Problem-Solving	Creative Thinking Skills									
	Aw.	Fl.	Flx.	Per.	El.	Com.	Cour.	Cur.	Cr.	Imag.
1. Find the problem.	x	x				x		x	x	x
2. Recognize and list the facts.	x	x		x		x				
3. Brainstorm for solutions.		x	x		x		x		x	
4. Speculate on effects of solutions.	x	x	x		x	x	x	x	x	x
5. Decide upon a solution				x		x	x		x	
6. Field test solution.				x		x			x	
7. Report results of field test.				x	x	x	x		x	

Creative Problem-Solving Behaviors

Creative Problem-Solving Process:	Teacher Behaviors	Learner Behaviors
Find Problem	Present Task Fluency Task. Make a list of possible problems associated with the task. Help learners move toward precision in stating problems. Call for Task. Lead learners to a problem statement that is clear and reflective of the preceding ideas focused upon by the group.	 Oral lists Written lists Make problem statements and clarify statements in pursuit of precision. Engage in process of negotiating toward clear problem statement.
Recognize and List Facts	Fluency Task. Make a list of all the facts. Assist learners in research tools to further understand facts related to task.	Oral lists Written lists Engage in process of uncovering facts that relate to problem. Continue to list facts. Reflect to statement of problem (elaboration).
Brainstorm for Solutions	Review for learners brainstorming rules. 1. Every idea is shared and considered. 2. No editing--by self or others. 3. All ideas are heard. 4. Criticism is not allowed. 5. Build and elaborate upon ideas already expressed. 6. Be fluent. 7. Quantity of ideas is wanted.	Engage in brainstorming process. Hitchhike and elaborate on ideas. Be fluent with ideas. Be flexible.

Creative Problem-Solving Behaviors

Creative Problem-Solving Process:	Teacher Behaviors	Learner Behaviors
Speculate on Effects of Solutions	Model appropriate questions that provide *what if* considerations.	Project what might occur if various solutions were put into effect.
Decide on Solution	Fluency Task. Make a list of criteria that establishes effectiveness of solution. Help learners move toward a selection of one solution. Encourage group cooperation and decision-making behavior.	Oral lists Written lists Narrow down. Eliminate ideas that don't appear to provide solution to statement of problem.
Field Test	Provide reference materials and resources. Provide in and out of school time for learners to field test.	Engage in use of resources and references. Productively use time to accurately test and record results of solution.
Report Results	Provide time for analysis of learners' field test results. Encourage learners to use various media and methods for sharing their results.	Engage in individual and group effort to precisely and clearly present solution to statement of problem.

Questions and Considerations in Creative Problem-Solving

The following is a list of questions that might be useful to learners as they work through the task of solving a problem. The questions can be used directly by the teacher or asked internally by learners.

Find the Problem:

1. What questions can be asked to better understand the problem?
2. What do you know about the problem?
3. What skills do you need to know to help solve this problem?
4. What would you like to know more about to help solve this problem?
5. How can you best state the problem so that it is clear?

Recognize Facts:

1. What facts do you know about this problem that will help you solve it?
2. What information do you need to understand to solve this problem?
3. Where can you obtain this information?
4. How can you go about obtaining this information?
5. In what ways will this newly obtained information help you solve the problem?
6. Have you gathered and listed all the necessary facts?

Brain-storming:

1. What are all the possible solutions to the problem?
2. Are there other ways to perceive the problem that give clues to other solution processes?
3. Can you add onto another idea?
4. Can you make a connection with an idea that is unusual?
5. Have you considered all your thoughts? Don't eliminate any of your ideas.

Speculate on Effects:

1. What might happen if you use this solution?
2. Will there be any side effects that you hadn't considered?
3. Will you get the results that you intended?

Decide upon Solution:

1. Have you eliminated all the ideas that don't fit your mental criteria for the effects you desire?
2. Is this the best solution?
3. Are there other solutions that you want to consider?
4. Do you know the process that you will use to implement this solution?
5. How will you test to see if you have a solution?

Field Test:

1. Have you asked the right questions?
2. Are there any variables you hadn't previously considered?
3. Is the solution process working the way you intended?
4. Do you need to make alterations or other changes?
5. Are you accurately recording your results?

Reporting Results:

1. What are the results of the field study?
2. Were your results accurate? If you are still dissatisfied with the results of your solution or finding, what other ways can you restate or perceive a solution to your problem?
3. Have you defined the correct problem to get the results you want through the process you have chosen?
4. Will you attempt to solve the problem in another way?
5. How do your results compare with your previous speculations or those findings of your peers/colleagues?
6. In what ways can you display or make public the problem as you stated it, the process you chose to solve it, and the information, answers, solutions, and conclusions that you made?
7. How do the results of your study and hard work relate to the statement of the problem as you first recognized it?
8. How can you connect the findings to the cause or statement of the problem?
9. Are you satisfied with your results?

A Creative Problem-Solving Process for a Futuristic Problem*

The following steps follow a process used in a 5/6 MGM classroom with learners who were discussing the stated task:

> As larger and larger numbers of people are available in the work force and automation decreases the number of available jobs, a possibility exists for a shorter work week and earlier retirement, which can lead to increased non-work time on people's hands. Without using the second job concept, think of ways that the increased non-work time could be productively used to solve some social, political, or economic problem. (This task comes from *72 Ways to Have Fun with My Mind*, Kabyn Books.)

1. Students list the issues involved in an attempt to define the problem. (a) What are examples of social, political, economic problems? (b) What might they be in the future? (c) Why do these problems exist? (d) Which are international, national, state, local?

   List students' thoughts on the chalkboard. Ask learners to categorize their responses in areas that may emerge as a statement of problem.

2. After several issues, suggestions, and ideas are shared, the students identify the facts.

3. Brainstorm for solutions to the problem. For example, "In what ways can the non-work time be used to resolve other problems?" Do this orally, as one person's ideas generate another's.

   Encourage students to list ideas on their own sheet of paper. At the close of the session, ask students to ponder ideas overnight and to bring 10 ideas for solutions to class for the next session.

4. In the next session, review the statement of problem. Ask for new responses for solutions to the problem.

   Encourage students to be flexible in their thinking, to think beyond the traditional set or concept. Ask them to associate ideas not usually associated together.

   Example: housing shortage - free time on people's hands.

   Encourage students to give their imagination priority. Remind students that any idea is welcome.

5. After students have listed their ideas, group students in clusters of four or five with the direction that they are to share their ideas for solutions with each other. After ideas have been shared by individuals, students should build or elaborate upon each other's ideas. The group then begins

*As reported in *CPS Newsletter*, Volume I, Numbers 1, 2, 3

to select solution ideas they are most interested in developing. All students in the group have input into the decision-making process. In the previous steps, students were working with a broad problem. Now they should begin to develop more explicit statements as to what they will attempt to solve. (Teacher input may be necessary to demonstrate explicit, specific statements of problem.)

6. The above groups are to define specifically the problem they are attempting to solve. To do so they must select the best ideas by determining the potential value and implications of ideas. Students must evaluate and judge systematically. Their evaluative criteria are objective standards against which they determine which ideas are most useful for solving their particular problem.

   Students now have rendered a large and complex problem into the manageable problem statements and prospective solutions. The task at this point is to field test and debrief the possibilities.

7. Having identified feasible solutions for the problems that emerged from a previously stated futuristic issue, learners are responsible for field testing their solutions. Learners participate in various kinds of testing procedures, for example, interviews, observations, library research, analysis of data, and computations. Testing might consume several in and out of class hours. Often learners become bored with the tedium of this stage or frustrated as clear directions fail to emerge. Both boredom and frustration are important in creative problem-solving and should be nurtured, not avoided. Learners are responsible for seeing the task through to completion. Teachers are responsible for encouraging perseverance and creative courage in the face of learners' avoidance behaviors.

8. A final stage in the process of systematic creative problem-solving occurs when learners have completed field testing and have, therefore, managed to construct a documentable judgment regarding the appropriateness of their speculated ideas. The judgments can be formally prepared in a report, whether oral or written, that reflects their processes and findings relative to the problem. Teachers should feed back to reporters how their processes and findings may have raised new problems.

The aforementioned steps in a creative problem-solving process may seem parallel to widely known problem-solving systems (state problem, review literature, etc.); however, these steps deviate in several very important ways. First, learners are articulating problems in unknown areas by utilizing fluent thinking and group process techniques. Second, learners are stating new or unique criteria for judgments, not placing reliance on the stable criteria to which traditional scientific method responds. Third, the element of avoidance that so often infects people's problem-solving processes functions largely from the distress borne of new territory, rather than the boredom of following old rules. These deviations are important and make the futuristic problem-solving strategies in these stages qualitatively different.

Futuristic Problems to Solve

1. Animal Welfare

The issues of inhumane treatment of animals, conservation of wildlife, preservation of the natural resources, saving the endangered species vs. the progress of civilization, the sport of hunting, rodeos, dog fights; for economic survival; the need for animals for research; the need for birth control for domestic pets are issues about which almost everyone has an opinion.

For creative problem-solving topics research the facts. Think about what the problems might really be. Get together with a group of your friends and brainstorm solutions to the problems.

The Great Learning Book, Menlo Park, California: Addison-Wesley Publishing Company, 1974, has a tremendous list of sources to whom learners may write letters asking for information or expressing concerns.

Two sources that might be of interest to you are:

Animal Protection Institute of America
P.O. Box 22505
Sacramento, CA 94822

Animal Welfare Institute
P.O. Box 3650
Washington, DC 20007

The Great Learning Book also lists resources to read to find the facts. Some of these are:

Cox, James. *The Endangered Ones.* Crown Publishers, 1975.

Regenstein, Lewis. *The Politics of Extinction.* Macmillan, 1975.

Davies, Brian. *Savage Luxury: Slaughter of the Baby Seals.* Taplinger Publishing Co., 1971.

Carson, Gerald. *Men, Beasts, and Gods.* Charles Scribner & Sons, 1972.

2. The Right to Die

The right to die and the living will are signs of an individual's struggle to natural death, as opposed to being kept alive by the highly technical medical machinery and know-how.

There are several sources that discuss the controversial issues of euthanasia. Research and discuss the why's and why not's of euthanasia.

Sources are:

"Euthanasia," *The Great Learning Book.* Menlo Park, California: Addison-Wesley Publishing Company, 1977.

"Active and Passive Euthanasia," *The New England Journal of Medicine*. January 9, 1975.

"The Right to Die," *Life Magazine*. January 14, 1972.

Jury, Mark and Dan. *Gramp*. Grossman Publishers, Viking Press, 1976, paperback.

Behnke, John and Sissela Bok, ed. *The Dilemmas of Euthanasia*. Anchor Books, 1975, paperback.

Krant, Melvin J., M.D. *Dying and Dignity: The Meaning and Control of a Personal Death*. Charles C. Thomas, 1974, paperback.

Kübler-Ross, Elisabeth. *Questions and Answers on Death and Dying*. Macmillan, 1974, paperback.

3. Individual Freedom

The right to be an individual and the right to be different are issues of freedom in our country.

In the series *Walk in My Shoes It's a Free Country*, "Honor Society," Englewood Cliffs, New Jersey: Prentice-Hall, 1976, Senator Daniel K. Inouye tells of his own personal pain with being different in high school. He speaks of the pain and anger he felt when he was interviewed for the honor society in his high school. The humiliating interview that focused on his bare feet and absence of white shirt and tie, rather than on his achievements, interests, and ideas, had a lasting effect upon him. Senator Inouye points out that racial prejudice was not the cause for rejection because those who interviewed him were of his ancestry. Rather, he felt that the rejection occurred because of the resentment of those who would not conform to "their twisted ideas of what made an American."

Senator Inouye's experience of rejection from peers is not unique to him. Think how you might have handled yourself if you had been in Daniel Inouye's place. Think of ways to cope or deal effectively with peer pressure that exists in your school.

4. Banning of Books

Through the years, various books have been banned from the shelves of schools and libraries because they were found to be objectionable to someone.

Make a list of reasons why a book you have read might be objectionable to another person.

The following books that have been banned are taken from the source, *Banned Books*, Anne Lyon Haight, NY: R. R. Bowker Co., 1970.

Gulliver's Travels, Jonathan Swift, 1726. Banned because of its satire of courts and statesmen. It was considered wicked.

Robinson Crusoe, Daniel Defoe. The Spanish Church placed it on the banned book list in 1720.

Alice in Wonderland, Lewis Carroll. The book was banned in China in 1931 on the basis that animals should not use human language.

The Arabian Nights was banned from 1927-1931 in the United States.

The Call of the Wild, Jack London. Italy and Yugoslavia banned this book in 1929 because it was considered radical.

Mickey Mouse Comic Books, Walt Disney. East Germany banned these books in 1954 because it was believed that Mickey Mouse was an anti-communist rebel.

5. Transportation

Transportation, pollution, mass transit systems, and overcrowded freeways are issues addressed in an instructional unit produced by the National Science Teachers Association under contract with the U.S. Energy Research and Development Administration (now U.S. Department of Energy).

The facts and some of the activities following are part of the larger unit titled "Transportation and the City," grades 8, 9. Copies of the complete unit may be obtained from: U.S. Department of Energy, Technical Information Office, P.O. Box 62, Oak Ridge, TN 37820.

> "A major thrust of American invention in the last decade of the nineteenth century and for most of the twentieth century was toward the development of the suburb, which was an outgrowth of the single-passenger automobile. The great demand for cars strained the resources of many cities and small towns and called for a reconsideration of the balance that now exists between the needs of American society and its wants."

Discuss the consequences of replacing the number of cars in this country every 11 years. (There are now more than 100 million cars on the roads in the United States.)

Some of the factors you might want to consider are: air pollution, damage to plants, damage to lungs, traffic snarls, insufficient parking spaces, taxes from gasoline, assembly line jobs, steel, and how you would get where you want to go without a car.

Suppose the mayor of your city appointed you as the new director of mass transit systems. He/She wants your ideas on the serious problem of too many cars in the city and the underused public transportation facilities. What would you say in a letter to the mayor?

Henry Ford did not make the first automobile. What was the important first that he did do? (By the way, who did make the first auto?)

How did school change with the advent of better cars and roads?

It has been said that the automobile made people less dependent upon each other. How would you explain that statement?

What is photochemical smog and how does it affect people and things?

Did you know? For every baby born each year, two cars are made.

Did you know? Approximately 60% of the land area in Los Angeles is used for parking lots, roads, gasoline service stations, and repair garages.

Did you know? Los Angeles has artifical plants decorating the highways because pollutants kill the natural ones.

What are the facts; what are the issues; what are the real problems? Brainstorm solutions to what you see the problems to be.

Americans love their free time. We opt for more days off, shorter work weeks, and more recreational areas in which to relax and enjoy the outdoor life.

How do Americans get to their recreational areas? Henry Fairlie described it well in an article reprinted in *The Washington Post*, Sunday, July 31, 1977:

> "Americans in their hundreds of thousands now sail in the great bays and estuaries of their country; they get there by car. They now backpack in the wilderness and in the mountains; they get there by car. They now ski down the slopes of their country in winter and climb them in the summer; they get there by car. They go to their beaches to swim or to laze; they get there by car. They go to the desert in spring and find its beauties; they get there by car. Even in the cities during the week, they go increasingly to the tennis courts, swimming pools, and golf courses; they get there often by car. And these activities add up to millions upon millions, people using their country all year round. They need gasoline even to get to the places where they can then do what needs no gasoline."

Brainstorm alternatives to reaching your recreation destination.

If you wish to obtain lesson plans covering all phases of bicycle traveling available for Grades 6-9, write: Department of Transportation, 400 7th Street, S.W., Washington, DC.

Additional Problems to Solve*

6. The Vulnerability of Water Supply
7. Cultural Exclusion of the Aged
8. Global Firewood Shortage
9. Conflict Between Low-Slow Growth and Rising Expectations
10. Overfed, Undernourshied Populations

*These problem foci are identified in *The Futurist*, October 1977, pp. 274-278. This monthly journal is an excellent source for creative problem-solving.

Setting Up a Creative Problem-Solving Center in the Classroom

To establish a classroom Creative Problem-Solving Center that promotes creative thinking requires a definition of creative thinking skills. Creative thinking skills are defined as those attributes of the thinking process that promote arrangement, rearrangement, and redefinition of consciously known or speculated data for self and other directed purposes.

The purpose of a classroom Creative Problem-Solving Center is to provide the teacher and learner with creative thinking tasks and exercises that relate basic curriculum with creative thinking strategies, and provide processes of thinking that allow learner divergent response patterns.

Successful establishment, arrangement, and operation of a Creative Problem-Solving Center in the classroom depends upon certain factors.

Teacher commitment. The implementation of a successful Creative Problem-Solving Center and development of creative thinking skills weigh heavily with the commitment of the classroom teacher to cause and to allow creative thinking to occur. The success of the center is also a function of the extent to which learners are held responsible for their creative thinking behaviors. The attitude of teachers and learners and the systematic process in the way materials are used by the teacher and learner are important variables in the success of Creative Problem-Solving behaviors in the classroom. It is important to stress that creative thinking behaviors occur only with the understanding of and commitment to a systematic process built upon a theoretical model.

Acquisition of appropriate materials. Acquisition of materials appropriate for developing and nurturing creative thinking skills is possible for a minimal dollar expenditure. A wide variety of commercial materials has been reviewed by the Creative Problem-Solving Center for the purpose of identifying an inexpensive collection that offers appeal to individual teaching styles, while fulfilling the goal of a divergent curriculum. MGM classrooms could feasibly provide materials for a classroom Creative Problem-Solving Center wtih MGM site monies or AB 65 funds.

Establishment of a known work schedule. The classroom Creative Problem-Solving Center is most useful to learners when it is arranged in such a manner that materials are readily displayed and immediately accessible. Materials placed in the center should need minimal instruction time from the teacher. Students may be assigned the task of using materials from the center x-number times per week, or students may use the center at their own discretion. Teachers may prefer to assign learners specific times and tasks from the center. Learners may use materials individually, with a partner, in small groups, or with the entire class. Depending on teacher style, center materials may be used under the direct or indirect guidance of the teacher or other adult.

Management system. If the classroom teacher's management system calls for a formal record-keeping system, learners can record their visits to the center in the following ways:

1. Indicate on a wall chart at the center their visits to the center.

2. Record their visits in a composition book, indicating the date, tasks, and activity.

3. Record their visits on contracts whose contents include Creative Problem-Solving tasks found at the center.

Clarification of direction. Directions on how to use the center can be stated precisely at the center table. The directions might include:

1. How to use the materials
2. Where to record learner responses
3. Careful replacement of materials in the center
4. Use of nonconsumable material
5. Ways to share learners' responses with other individuals
6. Encouragement to learners to create their own creative thinking tasks

Problem-Solving Center and basic curricular objectives. Creative thinking tasks such as those found in Kabyn Books, *SOI Abilities Workbooks, Classroom Ideas for Encouraging Thinking and Feeling, Teaching for Thinking,* and many others listed in this guide relate to school curriculum. Subject matter such as social studies, math, science, and language arts are woven throughout and provide opportunities to think. The thinking skills required in completing these tasks demand a behavior that strengthens appropriate school learning behavior. Therefore, learners not only focus on basic skills, but also strengthen those skills that allow thinking in a divergent manner.

On the basis of experience under the auspices of the funded Creative Problem-Solving Center, if the above factors are taken into account according to the guidelines at least implied in this section, it will be possible for teachers, with a minimum of expenditure and classroom reorganization, to achieve maximum results from their classroom CPS Center.

After careful study the following materials have been recommended as a set appropriate for a classroom Creative Problem-Solving Center.

1. *Ways to Have Fun with My Mind* (one per learner) $1.50 each

   Levels: 42 Ways: Pre-Skill
   52 Ways: Primary-Elementary
   62 Ways: Elementary-Middle School
   72 Ways: Middle School-Secondary

   Kabyn Books
   P.O. Box 19663
   Navajo Station
   San Diego, CA 92119

2. *Classroom Ideas for Encouraging Thinking and Feeling* (one book) $7.50 each

   Dissemination of Knowledge
   771 East Delavan Avenue
   Buffalo, NY 14215

3. *New Directions in Creativity* (a series of three books of spirit masters) $15.00 series

   Mark I
   Mark II
   Mark III

   Harper and Row
   2550 Crawford Avenue
   Evanston, IL 60201

4. *Thinking Kabyn* Task Cards (one set) $8.00 set

   Kabyn Books
   P.O. Box 19663
   Navajo Station
   San Diego, CA 92119

5. *The Book of Think* (one book) $5.00 each

   Little, Brown and Co.
   34 Beacon Street
   Boston, MA 02106

6. *Teaching for Thinking* (one book) $7.25 each

   Kabyn Books
   P.O. Box 19663
   Navajo Station
   San Diego, CA 92119

7. *SOI Abilities Workbooks: Divergent Production, Basic or Advanced; Evaluation, Basic or Advanced* (individual books) $7.00 each

   SOI Institute
   214 Main Street
   El Segundo, CA 90245

8. *Basic Thinking Skills* booklet $2.50
   (a series of 11 booklets or 11 sets of ditto masters) ditto masters $7.95

   Midwest Publications Co., Inc.
   P.O. Box 129
   Troy, MI 48099

Rationale:

The *Ways to Have Fun with My Mind* series ranges in complexity from pre-skill primary learners through secondary school learners. Designed and priced as consumables, the books offer creative thinking skills built into school content learning tasks. Teachers can equip their center with any combination of levels.

Classroom Ideas for Encouraging Thinking and Feeling is a teacher's idea book that provides 387 creative thinking skills. The *Thinking Kabyn* task cards can be used by both teachers and learners. The collection contains 160 creative thinking tasks, all color coded to mathematics, language, science, and social studies. *The Book of Think* is one of a series of books about large ideas designed for people who want to approach problems. This series has been developed by teachers in California and has shown tremendous appeal for teacher and learners. *Teaching for Thinking* offers an instructional index to the *Ways* books above, as well as a creative thinking theoretical model and suggestions for unit plans that relate creative thinking to school content. The *SOI Divergent Production* and *Evaluation Workbooks* are clearly presented, useful lesson guides for teaching intellectual abilities. While many of the abilities are only theoretically defensible, the workbooks nonetheless provide a variety of perspectives on teaching skills and abilities.

New Directions in Creativity is a series of three books of spirit masters for creative tasks for primary and upper elementary grades. *Basic Thinking Skills* is a series of 11 booklets or ditto masters, each containing activities to sharpen thinking skills. The material depends heavily upon analogies for content, where the analogy is a way of causing learners to process vocabulary and meaning in thinking ways. The material ranges in complexity through the elementary and middle school levels and contains both teacher and learner materials.

The only items on the recommended list that need to be purchased annually are the consumable *Ways* books. The rest are not consumable, and they are sufficiently sturdy to last indefinitely.

Recommended First Year Setup

Ways to Have Fun with My Mind (30 @ $1.50)	$ 45.00
Classroom Ideas for Encouraging Thinking and Feeling	7.50
New Directions in Creativity	15.00
Thinking Kabyn	8.00
The Book of Think	5.00
Teaching for Thinking	7.25
SOI Abilities Workbooks	7.00
Basic Thinking Skills	7.95
	$102.70

Each Additional Year

Ways to Have Fun with My Mind (30 @ $1.50)	$ 45.00

Materials List for Creative Problem-Solving Center

A collection of commercial materials exemplifying creative thinking skills was purchased with monies available under the direction of Dr. David Hermanson, Director of Gifted Education, San Diego Unified School District. (See Creative Problem-Solving Center for explanation of display and use of materials.)

Title of Material	Publisher	Price
Math, Writing and Games	Random House	$ 6.95 set
New Directions in Creativity Mark I, Mark II, Mark III	Harper and Row	15.00
Think Lab II	Norman Watkins	82.50
SRA Problem-Solving Kit	Norman Watkins	85.00
Can You Imagine?	Ginn & Co.	7.05 set
Reader's Workshop I	Readers Digest Services, Inc.	132.00
Reader's Workshop II	Readers Digest Services, Inc.	132.00
Kit C (Level 5-7)	Readers Digest Services, Inc.	136.50
Curriculum Correlation Guide	USMES Ed. Dev. Center	1.50
Intermediate "How to" Series	USMES Ed. Dev. Center	3.50
Teacher Resource Book-- Advertising	USMES Ed. Dev. Center	3.65
Teacher Resource Book-- Classroom Design	USMES Ed. Dev. Center	3.65
Teacher Resource Book-- Classroom Management	USMES Ed. Dev. Center	3.65
Teacher Resource Book-- Design Lab Design	USMES Ed. Dev. Center	3.65
The Dot and the Line	Creative Publications	3.75 each
Snow Crystals	Creative Publications	6.50 each
Thinking Goes to School	Creative Publications	5.95 each
The Metaphoric Mind: A Celebration of Creative Consciousness	Addison-Wesley	4.46
Mira Math for Junior High Geometry	Creative Publications	3.25
MIRA	Creative Publications	3.15 each
Tessellations: The Geometry of Pattern	Creative Publications	6.95
Teerers Posters	Creative Publications	4.75 set

Title of Material	Publisher	Price
Creating Escher-Type Drawings	Creative Publications	$ 6.50
Superstructures	Creative Publications	11.00
Design Posters	Creative Publications	4.95
Mathematical Puzzles of Sam Loyd	Creative Publications	2.50
Mathematics, Magic and Mystery	Creative Publications	2.50
Mathematical Carnival	Creative Publications	3.00
Kaleidoscope Math and Mirrors	Creative Publications	10.00
Kaleidoscope Posters	Creative Publications	7.95
Mira Math for Elementary School	Creative Publications	3.25
Soma Puzzle	Creative Publications	4.50
Helix	Creative Publications	6.00
Successful Problem-Solving Techniques	Creative Publications	5.50
The Book of Think	Creative Publications	5.50 each
Aftermath Series	Creative Publications	17.50 each
The I Hate Mathematics! Book	Creative Publications	4.25 each
More Mathematical Puzzles of Sam Loyd	Creative Publications	2.50
Master Mind Regular	Creative Publications	4.00
Challenging Mazes	Creative Publications	2.25
Seeing Shapes	Creative Publications	4.25
Experiences in Visual Thinking	Creative Publications	14.50
3D Tic-Tac-Toe	Creative Publications	8.50
Soma Puzzle Solutions	Creative Publications	1.75
Impuzzables	Creative Publications	8.00
File Folder Math Book A, B, C	Creative Publications	25.00
Banking on Problem-Solving in Elementary School	Creative Publications	15.00
The Answer is One--The First One	Creative Publications	4.95
The Answer is One--The Third One	Creative Publications	4.95
Math Art Posters Set A	Creative Publications	7.00
Math Art Posters Set B	Creative Publications	7.00
Number Pattern Posters	Creative Publications	3.75
Prime Drag	Creative Publications	4.75
What Are My Chances--Book A	Creative Publications	5.50

Title of Material	Publisher	Price
Words Worth	Creative Publications	$ 8.50
Master Mind-Deluxe	Creative Publications	9.95
Grand Master Mind	Creative Publications	13.75
Number Master Mind	Creative Publications	5.75
Laboratory Laughter (Science)	Nueva Learning Center	4.00
Word Ways	Nueva Learning Center	4.00
Springboard (Social Studies)	Nueva Learning Center	6.50
Shared Decision-Making	Nueva Learning Center	25.00
Enhance Chance	Nueva Learning Center	6.50
Do Decimals First	Nueva Learning Center	4.00
Fraction Tile Program	Nueva Learning Center	25.00
Let's Pattern Block It	Nueva Learning Center	7.50
Environmental Geometry	Nueva Learning Center	3.00
Science and Mathematics	Nueva Learning Center	10.00
The Balance Book	Nueva Learning Center	3.50
Think About It	Midwest Publications, Inc.	2.50
Critical Thinking--Book 1	Midwest Publications, Inc.	7.95
First Book of Space Form Making	Nueva Learning Center	3.00
The Fabric of Mathematics	Nueva Learning Center	16.00
Tangram Geometry in Metric	Nueva Learning Center	4.00
Recognizing Word Relationship	Barnell Loft, Ltd.	11.95
The Great Learning Book	Addison-Wesley	6.80
Thinker Things: A Student-Generated Approach to Language Excellence	Addison-Wesley	16.20
Essence I	Addison-Wesley	23.40
Essence II	Addison-Wesley	39.00
Analogies A	Midwest Publications, Inc.	2.50
Effective Thinking: Ways of Problem-Solving	The Center for Humanities, Inc.	169.50
How Do You Figure That? Ways of Problem-Solving	The Center for Humanities, Inc.	124.50
Big Book of Independent Study	The Creative Learning Tree	15.95
Research It!	The Creative Learning Tree	4.95

Title of Material	Publisher	Price
Queries 'n' Theories	The Creative Learning Tree	$ 12.00
A Scope Activity Kit: Exploring the Unknown	Scholastic Books	29.95
A Scope Activity Kit: Who Am I?	Scholastic Books	29.95
Parnes, Noller, Biondi--Guide to Creative Action	Charles Scribner's Sons	8.95
Parnes--Creative Action Book	Charles Scribner's Sons	4.95
Frank Williams' Kit for Individualizing and Humanizing Learning Process	Education Technology Press	80.00
Watson-Glaser Critical Thinking Appraisal Form YM	The Psychological Corporation	14.25
Remote Associates Test	Houghton-Mifflin	5.40
Aware	Random House	113.52
Basic (K-8) Evaluation General Ability Workbook	SOI Institute	7.00
Advanced (7-12) Evaluation General Ability Workbook	SOI Institute	7.00
Basic (K-8) Divergent Production General Ability Workbook	SOI Institute	7.00
Advanced (7-12) Divergent Production General Ability Workbook	SOI Institute	7.00
First Thinking Skills Development Program	Benefic Press	180.00
Thinking Skills, Development Program II	Benefic Press	159.00
Analogies B	Midwest Publications, Inc.	2.50
Analogies C	Midwest Publications, Inc.	2.50
Analogies D	Midwest Publications, Inc.	2.50
Antonyms and Synonyms	Midwest Publications, Inc.	2.50
Antonymns, Synonyms, Similarities, and Differences	Midwest Publications, Inc.	2.50
Miscellaneous, Including Transitivity and Same Person or Not?	Midwest Publications, Inc.	2.50
Patterns	Midwest Publications, Inc.	2.50
Classroom Ideas for Encouraging Thinking and Feeling	DOK Publishers	7.50 each

Title of Material	Publisher	Price
62 Ways to Have Fun with My Mind	Kabyn Books	$ 1.50 each
72 Ways to Have Fun with My Mind	Kabyn Books	1.50 each
42 Ways to Have Fun with My Mind	Kabyn Books	1.50 each
52 Ways to Have Fun with My Mind	Kabyn Books	1.50 each
Teaching for Thinking	Kabyn Books	7.25 each
Nuffield Math Project Problems: Green Set	J. Wiley & Sons, Inc.	3.94
Nuffield Math Project Problems: Purple Set	J. Wiley & Sons, Inc.	3.94
Jr./Sr. High Comprehension Paks	The Learning Center	23.70
Intermediate Comprehension Paks	The Learning Center	23.70
Good Apple Newspaper	The Learning Center	18.00
Dandylions Never Roar, Imagination and Me, and Anything Can Happen Records	The Learning Center	15.95 set
Activity Books for above records	The Learning Center	22.00 set
Ballad of Lucy Lunn Record	The Learning Center	5.95
Interstudent Basic Subscription	The School of Economic Science & Social Philosophy	10.00
Problem-Solving Kit	SRA	85.00
Brain Stretchers--Book I	Midwest Publications Inc.	6.95
Critical Thinking--Book I, Teacher's Manual	Midwest Publications Inc.	3.95
Decoding Through Thinking	Midwest Publications Inc.	5.95
Decoding Through Thinking, Teacher's Manual	Midwest Publications Inc.	4.95
1,000 Ideas for Term Papers	Social Studies School Service	8.75
Beyond the Easy Answer	Social Studies School Service	4.95
The Future File	Social Studies School Service	9.95
Teaching the Future	Social Studies School Service	7.95
Mind-Boggling Brain Benders	Social Studies School Service	.95
Council	Social Studies School Service	22.00
Newscast	Social Studies School Service	22.00
Powderhorn	Social Studies School Service	15.00
Culturecontact II	Social Studies School Service	35.00
Boxcard	Social Studies School Service	10.00

Title of Material	Publisher	Price
Rafa Rafa	Social Studies School Service	$ 15.00
Homefront	Social Studies School Service	14.00
World	Social Studies School Service	22.00
The Economy Game	Social Studies School Service	8.95
Code	Social Studies School Service	10.00
Join	Social Studies School Service	5.00
Explosion	Social Studies School Service	22.00
Lost Pages from American History	Social Studies School Service	8.95
Cope	Social Studies School Service	14.00
Profiles of the Future	Social Studies School Service	1.50
Value Questionnaires for Future	Social Studies School Service	2.00
The Future	Social Studies School Service	1.95
Futuristics	Social Studies School Service	65.20
Teaching the Future	Social Studies School Service	7.95

RESOURCES

Resources

The following material is a collection of teacher and classroom resources associated with creative thinking skills. This list is in addition to the material list organized for the CPS Center and materials referenced throughout this guide.

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Bennett, J., and P. Markle. *Structure of Intellect in the Classroom, A Guide for Teaching*. San Diego Unified School District, San Diego, 1978.

Bowman, L.E. *70 Cues for Teachers*. Scottsdale, Arizona: The Arizona Experiment, 1972.

Brandon, L. "Creative Use of Media," *Through A Glass Darkly: Classroom Practices in Teaching English* (ed. E.R. Fagan and J. Vandell). Urbana, Illinois: National Council of Teachers of English, 1971.

Carlson, R.K. *Sparkling Words: Two Hundred and Twenty-Five Practical and Creative Writing Ideas.* neva, Illinois: Paladin House, 1973.

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Eberlie, F. F. *Classroom Cue Cards for Cultivating Multiple Talent*. Buffalo, New York: DOK Publishers, 1974.

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Elkin, B. *The Loudest Noise in the World*. New York: The Viking Press, 1968.

Ets, M. H. *Talking Without Words*. New York: The Viking Press, 1968.

Fearn, L. "Individual Development: A Process Model in Creativity." *The Journal of Creative Behavior*, 10:55-64, First Quarter 1976.

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Fearn, L.,and U. Golisz-Benson. *52 Ways to Have Fun with My Mind*. San Diego, California: Kabyn Books, 1975

Fearn, L., and U. Golisz-Benson. *62 Ways to Have Fun with My Mind.* San Diego, California: Kabyn Books, 1976.

Fearn, L., and U. Golisz-Benson. *72 Ways to Have Fun with My Mind.* San Diego, California: Kabyn Books, 1977.

Fearn, L. *Teaching for Thinking: 311 Ways to Cause Creative Behavior.* San Diego, California: Kabyn Books, 1977.

Fearn, L., and U. Golisz-Benson. *The Thinking Kabyn.* San Diego, California: Kabyn Books, 1977.

Fearn, L., and K. Foster. *The Writing Kabyn: Sentences and Paragraphs.* San Diego, California: Kabyn Books, 1978.

Fearn, L. *Geocabulary Cards.* San Diego, California: Kabyn Books, 1978.

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Fisher, A. *In the Middle of the Night.* New York: Thomas Y. Crowell, 1965.

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Forte, I., and J. MacKenzie. *Creative Math Experiences for the Young Child.* Nashville, Tennessee: Incentive Publishers, Inc., 1973.

Forte, I., and M. Frank, and J. MacKenzie. *Kid's Stuff: Reading and Language Experiences Intermediate-Jr. High.* Nashville, Tennessee: Incentive Publishers, 1973.

Forte, I., M. A. Prangle, and R. Tupa. *Center Stuff for Nooks, Crannies, and Corners.* Nashville, Tennessee: Incentive Publishers, 1973.

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Koch, K. *Wishes, Lies, and Dreams.* New York: Vintage Books, 1970.

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Laliberts, N., and R. Kehl. *100 Ways to Have Fun with an Alligator and 100 Other Involving Art Projects.* Art Education, Inc., 1969.

Livingston, M. C. *Whispers and Other Poems.* New York: Harcourt, Brace and World, 1960.

Lueders, E., and P. St. John. *Zero Makes Me Hungry.* Glenview, Illinois: Scott Foresman, 1976.

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Meeker, M. N. *Structure of Intellect Abilities Workbook: Evaluation.* El Segundo: Structure of Intellect Institute, 1970.

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